TN Ambient Air Monitoring Plan

Tennessee Department of Environment and Conservation

Air Pollution Control Division

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Annual Air Monitoring Network Plan Acronym Glossary

AADT ..... Annual Average Daily Traffic
ANMP ..... Annual Network Monitoring Plan
AQI ..... Air Quality Index
AQS ..... Air Quality Subsystem
BAM ..... Beta Attenuation Monitor
CASTNET ..... Clean Air Status and Trends Network
CBSA ..... Core-Based Statistical Area
CFR ..... Code of Federal Regulations
CO ..... Carbon Monoxide
DAPC ..... Division of Air Pollution Control
DV ..... Design Value
EFO ..... Environmental Field Office
EPA ..... Environmental Protection Agency
FEM ..... Federal Equivalent Method
FRM ..... Federal Reference Method
µg/m3 ..... Micro Grams per Cubic Meters
MSA ..... Metropolitan Statistical Area
NAAQS ..... National Ambient Air Quality Standards
NCO ..... Nashville Central Office
NCORE ..... National Core Monitoring Station
NEI ..... National Emissions Inventory
NFO ..... Nashville Field Office
NPS ..... National Park Service
NO2 ..... Nitrogen Dioxide
NOx ..... Nitrogen Oxides
NOy ..... Reactive Oxides of Nitrogen
O3 ..... Ozone
PAMS ..... Photochemical Assessment Monitoring Station
Pb ..... Lead
PM2.5 ..... Particles with an average aerodynamic diameter of 2.5 microns or less
PM10 ..... Particles with an average aerodynamic diameter of 10 microns or less
PWEI ..... Population Weighted Emission Index
POC ..... Parameter Occurrence Code
ppb ..... Parts Per Billion
ppm ..... Parts Per Million
PQAO ..... Primary Quality Assurance Organization
PSD ..... Prevention of Significant Deterioration
SLAMS ..... State and Local Air Monitoring Stations
SO2 ..... Sulfur Dioxide
SPM ..... Special Purpose Monitor
TEOM ..... Tapered Element Oscillating Microbalance
TDEC ..... Tennessee Department of Environment and Conservation
Tpy ..... Tons per year
TVA ..... Tennessee Valley Authority

Introduction to the 2018/19 Ambient Air Monitoring Plan for Tennessee

The annual network monitoring plan (ANMP) that is presented in the following pages will address each of the requirements specified in the Code of Federal Regulations (CFR). An overview of the geography, general climate, wind patterns, and population trends are included to provide background information that will assist the reader in understanding the current air monitoring network and reasons for placement of the existing monitoring sites. The actual regulatory requirements that specify the number and placement of air monitoring sites are found in 40 CFR 58. The sections that provide this guidance are also included in the report as a reference to help better understand the actual monitoring needs in a given area.

In many instances, the areas for which monitoring is required are based on population criteria in which population must be considered to allow for monitoring in the areas where populations may be affected or exposed to the various criteria pollutants of concern. Additional monitoring sites are needed to address impacts to communities where source-related emission density might be elevated. Other considerations must also be addressed when selecting and operating air monitoring sites. The local influences of some types of sources (roadway dust or emissions) may be factors that require monitoring sites to be spaced certain distances from those sources. In the case of near-road or roadway monitoring activities, the monitors must be located very close to the potential sources of mobile emissions.

The principal areas in Tennessee with air monitoring sites are depicted with a graphic showing the locations for each of the monitoring sites. The sites are further identified with a site number, an Air Quality Site Identification (AQSID) and the types of pollutants being monitored at each location. Tables containing the relevant information for each site are also included. The tables are provided in two sections following the location graphic and have been condensed and combined from the previous year's format so that all relevant information can be found within each area's section of the report and relieves the reader from searching tables at the end of the report for information about a given site.

Each of the four local programs operating an air monitoring network in Tennessee provided a separate annual review. The local program's air monitoring network plan will be submitted at the same time as the State of Tennessee's annual ambient air monitoring plan. Where revisions were noted in the local networks, those revisions were added to the State's overall plan, see Table 1: Metropolitan Monitoring Configuration for 2018.

The recent changes in the National Ambient Air Quality Standards (NAAQS) have resulted in a need to evaluate additional air monitoring in order to comply with the new standards. In some cases (PM, O_3, SO_2 and NO_2), the revisions to the standard were augmented with revisions to the monitoring requirements. Some of the necessary changes to the monitoring networks have been completed while others are being planned for implementation. These changes appear in the QA Handbook Volume II January 2017.

The State of Tennessee is required to evaluate the ambient air monitoring network each year in accordance with requirements specified in 40 CFR Subpart B 58.10 and 40 CFR 58 Appendix D. All ambient air monitoring sites are meeting these regulatory requirements. Air monitoring evaluations can be found in Appendix G: Annual Site Evaluations & Documentation. The Jackson and Lawrence air monitors have approved Environmental Protection Agency (EPA) waivers and can be found in Appendix G: Annual Site Evaluations & Documentation.

The National Park Service (NPS) operates several air monitoring sites located within the Great Smoky Mountains National Park (GSMNP) and is responsible for the generation, review and validation of the data generated by these monitoring sites. The EPA has determined that these sites fall under the Primary Quality Assurance Organization (PQAO) oversight of the NPS and as such, are the responsibility of the NPS. TDEC has evaluated the current and historic monitoring data generated by these sites and confirms that all of the current ozone monitoring sites reported attaining ozone air quality data for the most recent evaluation periods including 2014 to 2016 and 2015 through 2017. Historically, Tennessee Dept. of Environment and Conservation Division of Air Pollution Control (TDEC DAPC) has assisted the NPS with limited support and a small amount of funding in cooperation with other partner agencies including EPA, NPS and Tennessee Valley Authority (TVA) in supporting the monitoring activities in the GSMNP and in processing air quality data for several of these sites.

The NPS ozone monitoring sites have consistently demonstrated compliance with the ozone NAAQS in recent years and with this in mind, TDEC DAPC has determined that its funding for these sites is no longer possible or necessary. TDEC DAPC appreciates the opportunity to provide past assistance to the NPS, but must look to the future support and maintenance of the air monitoring network that TDEC is required to operate, ensuring that the necessary resources are available. NPS will continue to operate monitoring stations in GSMNP and report the data to AQS for the 2018 monitoring season.

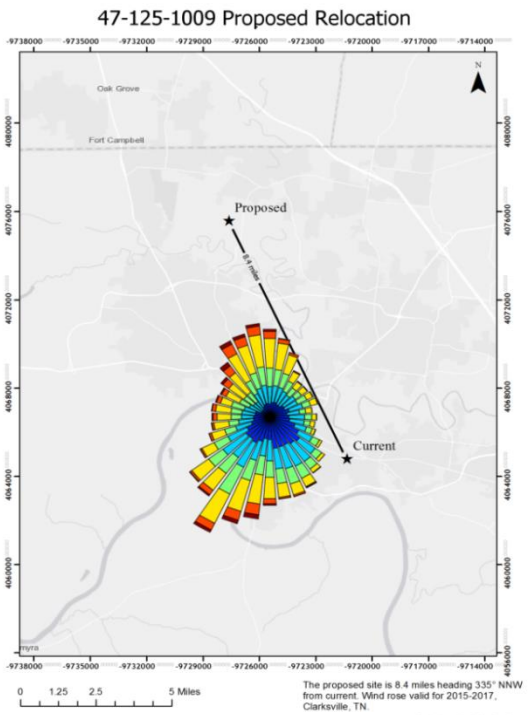
Proposed Revisions to Tennessee's Ambient Air Monitoring Network

The following section details the planned revisions to TDEC DAPC's air monitoring network for 2018-19.

$PM_{2.5}$ Monitoring:

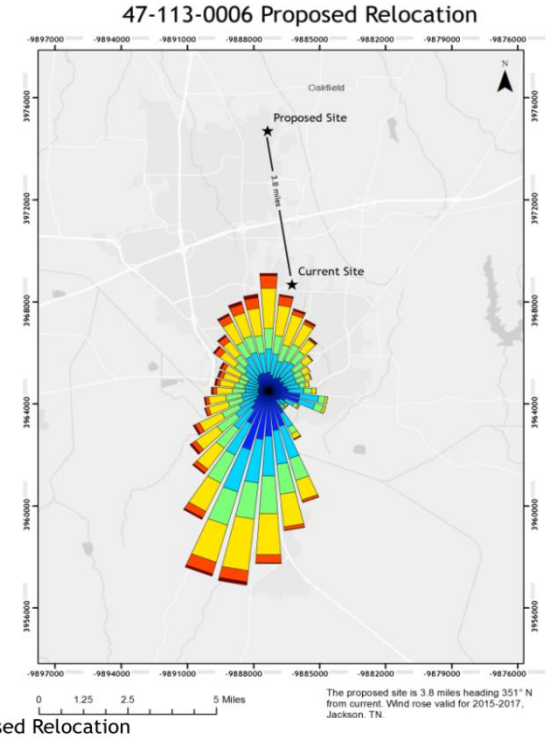
The State of Tennessee is proposing to relocate three $PM_{2.5}$ sites in order to comply with the siting requirements in 40 CFR Part 58 Appendix E. The three sites are Clarksville (47-125-1009), Jackson (47-113-0006), and Lawrence (47-099-0002). More information is in the attached proposals Appendix G: Annual Site Evaluations & Documentation. The graphics below summarize the proposed relocations with respect to the predominate wind patterns of the nearest populated area:

47-125-1009 Proposed Relocation



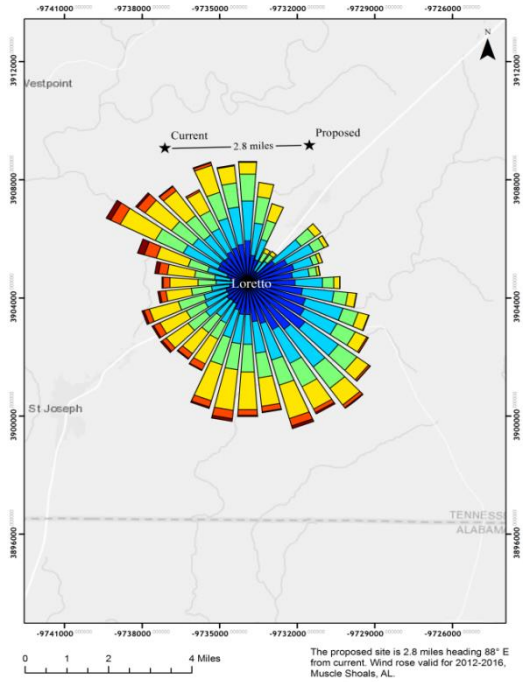
The proposed site is 8.4 miles heading 335° NNW from current. Wind rose valid for 2015-2017, Clarksville, TN.

47-113-0006 Proposed Relocation



The proposed site is 3.8 miles heading 351° N from current. Wind rose valid for 2015-2017, Jackson, TN.

47-099-0002 Proposed Relocation



The proposed site is 2.8 miles heading 88° E from current. Wind rose valid for 2012-2016, Muscle Shoals, AL.

PM_{10} Monitoring:

The State of Tennessee does not operate any PM_{10} monitors as a part of the state network. The previous PM_{10} site, Luttrell, was shut down on December 31, 2015. Additional information on the monitoring requirements can be found in Appendix D: Monitoring Network Requirements.

Ozone Monitoring:

All eight of the State's ozone sites will receive new, upgraded shelters to house equipment. Due to the logistics of deploying new shelters, nearly all of the sites will move a short distance (5 meters). This change will also require a site reconfiguration proposal to be considered by the EPA. Information that is more detailed can be found in Appendix G: Annual Site Evaluations & Documentation.

Carbon Monoxide (CO) Monitoring:

The State of Tennessee does not operate any CO monitors as a part of the state network. Additional information on the monitoring requirements can be found in Appendix E: CO Monitoring Network Requirements.

Nitrogen Dioxide (NO_2) Monitoring:

The State of Tennessee does not operate any NO_2 monitors as a part of the state network. Additional information on the monitoring requirements can be found in Appendix E: NO_2 Monitoring Network Requirements.

Community Wide Monitors

A Nitrogen Dioxide (NO_2) monitoring site that meets the community wide monitoring requirement is already in operation in the Nashville core-based statistical area (CBSA). The NO_2 monitor AQSID 47-037-0011, located on Trinity Lane in Nashville, Tennessee is identified in the EPA's air quality subsystem (AQS) as a state and local air monitoring station (SLAMS). In the Memphis CBSA, the State of Arkansas currently operates an NO_2 monitor at its Marion site, (05-035-0005).

National Core Monitoring Station

In October 2006, the United States EPA established the National Core (NCore) multi-pollutant monitoring network in its final amendments to the ambient air monitoring regulations for criteria pollutants (codified in 40 CFR parts 53 and 58). It is the expectation that each state will have at least one NCore site. Nationwide, approximately 50 sites will be located in urban locations and 20 sites in rural areas. The multi-pollutant monitoring approach at NCore sites will benefit health assessments, emissions strategy development, and future monitoring efforts. By providing data users, such as researchers and policy makers, with a robust suite of collocated pollutant and meteorological data, NCore sites will better characterize the numerous chemical and physical interactions between pollutants than what is traditionally available at compliance oriented monitoring sites. Shelby County operates the only required NCORE site in Tennessee. This site is detailed in the Shelby County ANMP plan. The Look Rock rural NCORE site is an optional site operated by NPS.

Near-Road Monitors:

There are currently two near-road sites in Tennessee, both operated in local program counties (Davidson and Shelby). The near-road monitoring network was initiated as part of the 2010 NO2 NAAQS review and has become a multi-pollutant (CO, NO_2, NO, NO_x, $PM_{2.5}$) monitoring network. The EPA, in cooperation with state, local, and tribal air agencies, has tracked the installation of near-road NO2 monitoring stations across the country. As part of this effort, the EPA has created a list of sites and captured critical meta-data about the sites, their target roads and general operations. Additional information on near-road monitoring networks can be found at https://www3.epa.gov/ttnamti1/nearroad.html and in Appendix D: Monitoring Network Requirements.

Lead Monitoring:

The State operates a single lead monitoring site in Sullivan County, Tennessee near the currently shutdown Exide facility. This site is located within the boundary of the current Bristol lead maintenance area. There are no proposed changes to this site.

Prevention of Significant Deterioration (PSD) monitoring:

The Prevention of Significant Deterioration (PSD) permitting program is a Clean Air Act preconstruction review program for new and modified major stationary sources of air pollution (e.g., power plants, manufacturing facilities). The program requires that the area where the source is located be classified as either in attainment or unclassifiable with the National Ambient Air Quality Standards (NAAQS). The NAAQS establishes maximum pollution concentration levels to protect public health and welfare from harmful levels of nitrogen oxides, ozone, sulfur dioxide, particulates, carbon monoxide, and lead. A PSD increment is the maximum allowable increase in concentration towards the NAAQS from the baseline concentration for a pollutant. The baseline concentration is set for each existing pollutant at the time that the first complete PSD permit application affecting the area is submitted. PSD increments prevent the air quality in clean areas from completely consuming remaining air quality to the level set by the NAAQS. This monitoring requirement is triggered when there is insufficient ambient air quality data necessary to determine compliance with the NAAQS. Under these criteria, either pre or post construction monitoring may be required to be conducted in the area near the facility being constructed.

Currently, TDEC DAPC does not operate any PSD monitors.

Sulfur Dioxide (SO_2) Monitoring:

The State of Tennessee operates two SO_2 monitoring sites in the Kingsport, TN area named as nonattainment by EPA in Sullivan County, Tennessee. One is located on Skyland Drive (47-163-6002) and the other (Ross N Robinson) on Wilburn Drive (47-163-6001). These sites satisfy the population weighted emissions index (PWEI) requirements for the Kingsport CBSA. The State of Tennessee is proposing two additional locations in the nonattainment area for SO2 monitoring as requested by EPA to supplement the State's attainment plan. The State has determined the additional monitors are necessary to establish a network that will adequately characterize the nonattainment area and provide monitoring in closer proximity to the maximum receptor areas as indicated in the modeling included within the attainment plan.

The two new locations have been selected and a formal proposal is attached Appendix G: Annual Site Evaluations & Documentation.

The State of Tennessee also operates an SO_2 monitoring site at Freels Bend (47-001-0101), in Anderson County, Tennessee. This site was established to assess emission impacts from a nearby TVA fossil plant. This site shares a shelter with the ozone equipment and will undergo a reconfiguration upon EPA's approval of the shelter replacement described in Appendix G: Annual Site Evaluations & Documentation. This State is also planning to propose ending SO_2 monitoring at this location in 2018/19. The proposal to end monitoring is a result of a reduction in the population weighted emissions index (PWEI) value calculated using the most recent population and SO_2 emission estimates (Table 7). The most recent three-year design value for the Freels Bend SO_2 monitor is 6 parts per billion (ppb), or 8% of the federal SO_2 standard (75 ppb). Ending SO_2 monitoring at this location would free up valuable resources that could then be dedicated to the robust SO_2 monitoring network in the Kingsport nonattainment area.

The Purpose of Tennessee's Ambient Air Monitoring Network

There are several criteria used to determine the need for ambient air quality monitoring. These criteria are as follows:

- EPA National Ambient Air Quality Standards (NAAQS) criteria pollutant monitoring network requirements for the NCore, formally NAMS (National Air Monitoring Site); SLAMS (State and Local Air Monitoring Site); and SPM (Special Purpose Monitoring) monitoring networks can be found in 40 CFR Appendix D to Part 58.
- The CFR sets forth as regulations the requirements for air quality monitoring to be implemented by the states and EPA. These requirements are primarily organized around population and emission density in a given area with the number of required monitors and the distribution of the monitors within the networks specified by these regulations. Additionally 40 CFR, Part 58, Appendix D specifies criteria that must be followed in designing the NCore and SLAMS networks. The EPA must approve design and/or modifications to these networks.
- Additional federal regulations also specify requirements for Prevention of Significant Deterioration (PSD) monitoring networks. This monitoring requirement is triggered as part of a PSD permit application review where there is no representative contemporaneous ambient air quality data for the area near the proposed PSD source site. Under these criteria, either pre or post construction monitoring may be required to be conducted in the area near the facility likely to be impacted (as determined by modeling) by emissions.
- Air quality monitoring is required to be conducted to alert citizens in given areas to elevated levels of air pollutants in cities or communities of designated population levels that are required to provide Air Quality Index (AQI) reports to the general public.
- Air quality monitoring is conducted to address the need for background air quality data.
- Special air quality monitoring studies are conducted based on identified needs for monitoring data in a given area.
- Citizen complaints and enforcement investigations related to air quality are other reasons for air quality monitoring usually in or around a specific area related to the complaint or investigation.
- Where warranted, requests from citizens for special air monitoring studies are also a reason for air monitoring activities.
- The federal regulations also specify the frequency, method, location requirements, equipment, quality assurance procedures and reporting of data collected from the ambient air monitoring networks.

Table 1: Metropolitan Monitoring Configuration for 2018

Census Area Identification and Population			Monitoring Program	Lead		CO		SO_2		NO_2		Ozone			PM_{10}		$PM_{2.5}$				$PM_{2.5}$ Speciation		$PM_{2.5}$ Cont.	
CBSA Code	Census 2010 / 2017	CBSA Title (MS Areas)	State / PQAO	Operating	Required	Operating	Required	Operating	Required	Operating	Required	Operating	2015 2017 8 Hr DV (ppm)	Required	Operating	Required	Operating	2015 2017 Annual DV µg/m³	2015 2017 24 Hr DV µg/m³	Required	Operating	Required	Operating	Required
16860	528,143 556,548	Chattanooga, TN-GA	GA 0437	0		0		0		0		0			0		1				0		0	
			TN 0170	0	0	0	0	0	0	0	1(b)	2	0.067	2	0(d)	1(d)	3	9.0(c)	18(c)	2	0	1(a)	1	1
			TN 1025	0		0		0		0		0			0		0				0		0	
17300	260,625 285,042	Clarksville, TN-KY	KY 0584	0		0		0		0		1			0		0				0		0	
			TN 1025	0	0	0	0	0	0	0	0	0	0.061	1	0	0	1	8.6	19	1	0	0	1	1
17420	115,788 122,317	Cleveland, TN		0	0	0	0	0	0	0	0	0		0	0	0	0			0	0	0	0	0
27180	130,011 129,235	Jackson, TN	TN 1025	0	0	0	0	0	0	0	0	0		0	0	0	2	6.9	14	0	0	0	2	1
27740	198,716 202,053	Johnson City, TN		0	0	0	0	0	0	0	0	0		0	0	0	0			0	0	0	0	0
28700	309,544 306,659	Kingsport-Bristol-Bristol, TN-VA	TN 1025	3	1	0	0	4 (e)	1	0	0	2	0.066	1	0	0	1	7.6(c)	18(c)	0	0	0	1	0
			VA 1127	0		0		0		0		0			0		0				0		0	
28940	837,571 877,104	Knoxville, TN	TN 0581	3		0		0		0		2			3		4				1		1	
			NPS 0745	0	1	1	0	1	1	0	1(b)	2	0.067	2	0	1	0	10.0(c)	34(c)	2	0	0	1	1
			TN 1025	0		0		1		0		2			0		3				0		3	

Census Area Identification and Population			Monitoring Program	Lead		CO		SO_2		NO_2		Ozone			PM_{10}		$PM_{2.5}$				$PM_{2.5}$ Speciation		$PM_{2.5}$ Cont.	
CBSA Code	Census 2010 / 2017	CBSA Title (MS Areas)	State / PQAO	Operating	Required	Operating	Required	Operating	Required	Operating	Required	Operating	2015 2017 8 Hr DV (ppm)	Required	Operating	Required	Operating	2015 2017 Annual DV µg/m³	2015 2017 24 Hr DV µg/m³	Required	Operating	Required	Operating	Required
32820	1,324,829 1,342,260	Memphis, TN-MS-AR	AR 0055	0	1	0	1	0	1	1	2	1	0.067	2	0	2	0	8.5	17	2	0	1	0	1
			MS 073	0		0		0		0		1			0		0				0		0	
			TN 0673	1		3		1		1		3			2		2				1		1	
			TN 1025	0		0		0		0		0			0		0				0		0	
34100	113,951 118,081	Morristown, TN	TN 1025	0	0	0	0	0	0	0	0	1	0.067	1	0	0	0			0	0	0	0	0
34980	1,670,890 1,903.045	Nashville-Davidson—Murfreesboro	TN 0682	0	0	1	1	1	1	2	2	2	0.066	2	1(d)	2(d)	2	9.7	19	2	0	1(a)	1	1
			TN 1025	0		0		0		0		3			0		2				0		2	

(a) EPA has defunded the required speciation sampling in these areas. The CFR requirement has not been revised.

(b) This monitor is the near road site that may not be funded. The CFR requirement has not been revised.

(c) This data is subject to change upon EPA's concurrence of exceptional event requests.

(d) Monitoring agency receives a waiver from EPA Region 4.

(e) Two additional monitors are proposed to begin operation in late 2018, subject to site approval by the EPA.

Table 2: Micropolitan Monitoring Configuration for 2018

Census Area Identification and Population			Monitoring Program	Lead		CO		SO_2		NO_2		Ozone			PM_{10}		$PM_{2.5}$				$PM_{2.5}$ Speciation		$PM_{2.5}$ Cont.	
CBSA Code	Census 2010 / 2017	CBSA Title (Micro Areas)	State / PQAO	Operating	Required	Operating	Required	Operating	Required	Operating	Required	Operating	2015 2017 8 Hr DV (ppm)	Required	Operating	Required	Operating	2015 2017 Annual DV ug/m3	2015 2017 24 Hr DV ug/m3	Required	Operating	Required	Operating	Required
11940	52,266 52,877	Athens, TN	TN 1025	0	0	0	0	0	0	0	0	0		0	0	0	1	8.3(a)	20(a)	0	0	0	1	0
18260	106,042 111,363	Cookeville, TN	TN 1025	0	0	0	0	0	0	0	0	0		0	0	0	1	7.3	16	0	0	0	1	0
20540	31,809 32,691	Dyersburg, TN	TN 1025	0	0	0	0	0	0	0	0	0		0	0	0	0	14	6.9	0	0	0	1	0
29980	41,869 43,396	Lawrenceburg, TN	TN 1025	0	0	0	0	0	0	0	0	0		0	0	0	0	6.7	14	0	0	0	1	0

(a) This data is subject to change upon EPA's concurrence of exceptional event requests.

Clean Air Status and Trends Network (CASTNET)

The Clean Air Status and Trends Network (CASTNET) monitoring network is designed to measure air quality in rural areas year-round. CASTNET sites in Tennessee and the state's metropolitan statistical areas (MSAs) are managed by the EPA's Clean Air Markets Division and operated by an EPA contractor. The three CASTNET sites in rural areas of Tennessee and Kentucky are as follows:

Table 3: CASTNET Sites in Tennessee

Site	AQSID	County	Location	2015 2017 DV (ppm)
Cadiz (CDZ171)	21-221-9991	Trigg	5720 Old Dover Rd, Cadiz, KY 42211	0.061
Edgar Evins (ESP127)	47-041-9991	DeKalb	Edgar Evins State Park, Smithville, TN 37166	0.061
Speedwell (SPD111)	47-025-9991	Claiborne	718 Russell Hill Rd, Speedwell, TN 37870	0.062

Monitoring Sites and Discussion

All TDEC DAPC operated sites meet the siting criteria as found in appendix E to 40 CFR Part 58 for probe and monitoring path for $PM_{2.5}$, ozone (O_3), lead (Pb), and sulfur dioxide (SO_2). These sites will be reevaluated annually for compliance with this criterion. These sites are part of the State of Tennessee ambient air monitoring criteria pollutant monitoring network and operated to ensure continued compliance with appendix D to 40 CFR Part 58 network design requirements. These sites are summarized in Table 1 and Table 2. Current site evaluations with photographs, distance measurements and confirmation of meeting the siting criteria requirements are provided in Appendix G: Annual Site Evaluations to this plan.

The individual monitoring sites below have graphs included of their daily measured parameters, displayed according to their respective daily design value statistic when applicable. The reader will notice an anomalous spike in the $PM_{2.5}$ data during the months of November 2016 and December 2016. These spikes were caused by an outbreak of wildfires in eastern Tennessee and surrounding states. Additionally, sites that transitioned from one method of $PM_{2.5}$ monitoring to another are displayed according to their new and historical parameter occurrence code (POC). For federal reference monitors (FRMs), POCs 1 and 2 are used and for federal equivalent monitors (FEMs), POCs 3 and 4 are used.

The Jackson and Lawrence sites are currently operating under an EPA approved siting criteria waiver pursuant to appendix E to 40 CFR Part 58 for probe and monitoring paths for PM2.5. New sites are being evaluated during CY 2018 that will meet all of the siting criteria. Copies of the approval letters are found in Appendix F: EPA Request and Approval Letters. These sites are part of the State's $PM_{2.5}$ criteria pollutant monitoring network and operated to ensure continued compliance with appendix D to 40 CFR Part 58 network design requirements. A summary appears in Table 1 and Table 2.

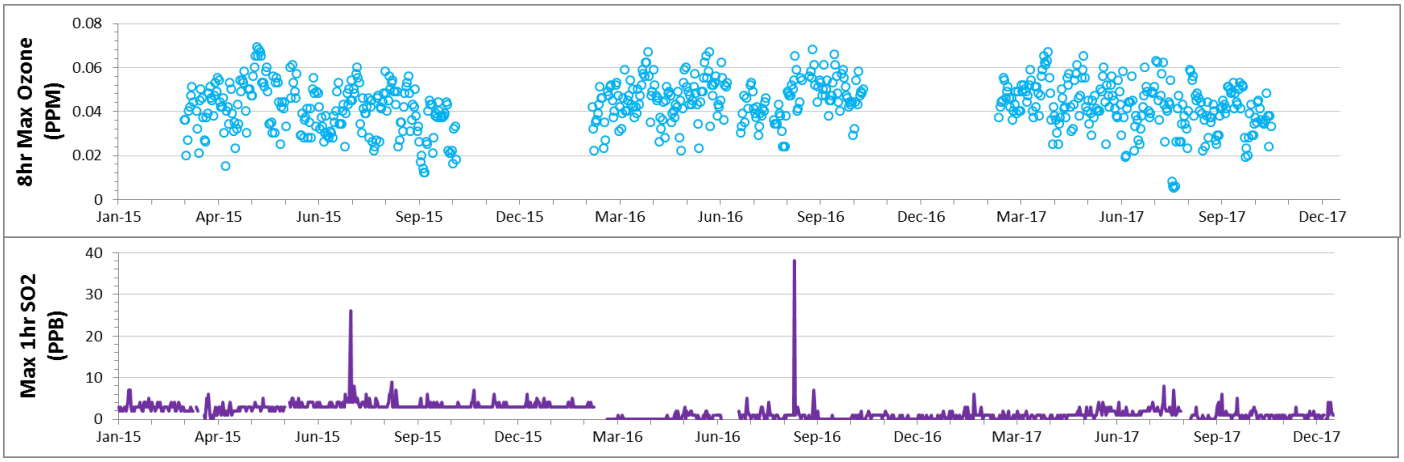
Freels Bend – Anderson County

Address	Freels Bend Study Area Melton Lake Oak Ridge	
AQSID	470010101	
CBSA	28940	
Lat, Lon	35.96522, -84.22316	
Parameter Code	42401	44201
Parameter Name	SO2	O3
Monitor Type	SLAMS	SLAMS
POC	1	1
Int	1	W
Collection Frequency	Hourly	Hourly
Method	100	87
FRM/FEM Instrument	TeledyneModel 100 E SO2 Analyzer	Model T400 Ozone Analyzer
Analysis	Ultraviolet Fluorescence	Ultra Violet Absorption
Ref Mtd ID	EQSA-0495-100	EQOA-0992-087
Monitor Objective	Population Exposure	Population Exposure
Dominant Source	Area	Area
Measurement Scale	Urban Scale	Urban Scale
Land Use Type	Forest	Forest
Location Setting	Rural	Rural

The Freels Bend site is located in Anderson County, Tennessee and currently supports monitoring for ozone and sulfur dioxide. The site was initially established in 1992 and is expected to operate during CY's 2018 and 2019. This site is located west of Knoxville and southeast of Oak Ridge, Tennessee. This site is an upwind site from the core Knoxville MSA. Sulfur dioxide monitoring began 03/01/2013 to assess emission impacts from the Bull Run FP. Because of the importance this site serves in assessing both the upwind ozone levels entering the Knoxville area and the ongoing need to continue to collect SO_2 data to assess area impacts near the TVA facility. This site was previously determined to remain in operation over 5 years (2015 through 2020), but due to changes in SO_2 monitoring requirements, TDEC DAPC will propose to shut it down before 2020. The Knoxville MSA has six ozone sites and is required to have only two. This site is also employed in the air quality index (AQI) forecasting program and currently is attaining the standards for both ozone and SO_2. See Appendix G: Annual Site Evaluations for further details.

In CY 2018, TDEC DAPC plans to replace the existing shelter with a new, upgraded shelter. Due to the logistics of shelter replacement, the site will undergo a reconfiguration. This reconfiguration will result in a new monitoring location approximately 22.4 meters from the existing site, heading 202° SW. This reconfiguration is subject to EPA approval; more details can be found Appendix G: Annual Site Evaluations & Documentation.

Freels Bend Daily Air Quality

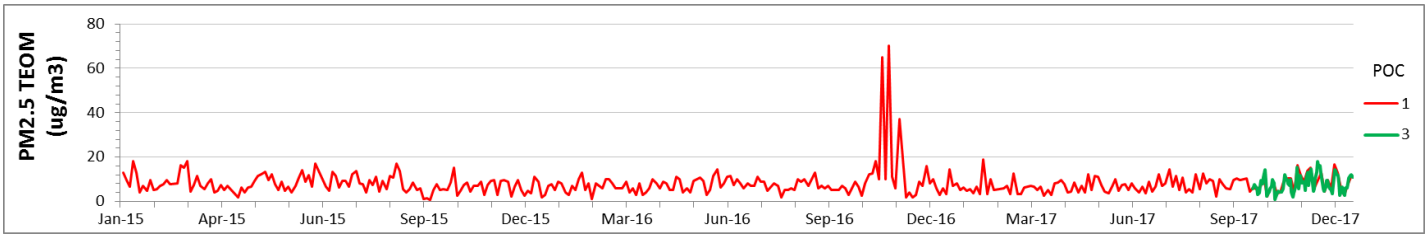


Maryville – Blount County

Address	2007 Sequoyah Avenue Maryville TN 37803
AQSID	470090011
CBSA	28940
Lat, Lon	35.768847, -83.942152
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022 FEM
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Maryville site is located in Blount County, Tennessee and currently supports monitoring for fine particulate matter. The site was initially established in 2000 and is expected to operate during CY's 2018 and 2019. This site is located south of Knoxville and northwest of the GSMNP. This site is an upwind site from the core Knoxville MSA. $PM_{2.5}$ monitoring began 05/01/2000 as a part of the original $PM_{2.5}$ state network. An FEM continuous $PM_{2.5}$ sampler replaced the FRM sampler on 01/01/2018. Because of the importance this site serves in assessing the upwind $PM_{2.5}$ levels entering the Knoxville area, this site was determined to remain in operation over 5 years (2015 through 2020). The Knoxville MSA has six PM2.5 FRM sites and is only required to have two to meet the minimum requirements. This site is also employed in the AQI forecasting program and is used to help assess impacts from precursor transport into Tennessee from Georgia and North Carolina. See Appendix G: Annual Site Evaluations for further details.

Maryville Daily Air Quality

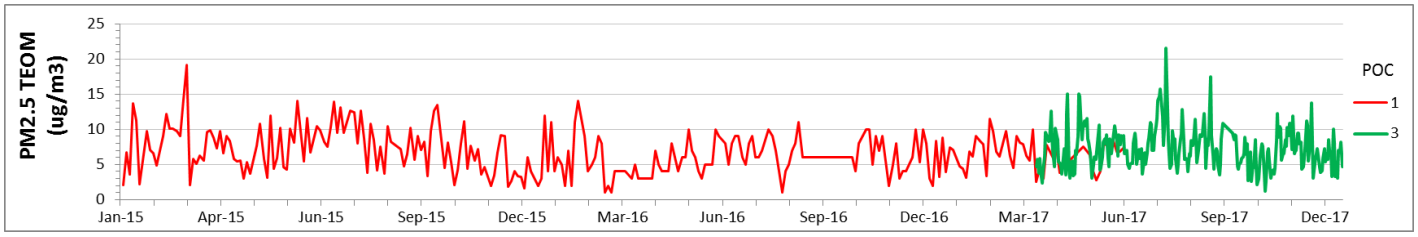


Dyersburg – Dyer County

Address	175-B Greenwood Street, Dyersburg TN 38024
AQSID	470450004
CBSA	20540
Lat, Lon	36.05266, -89.382157
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Dyersburg site is located in Dyer County, Tennessee and currently supports monitoring for fine particulate matter. The site was initially established in 1998 and is expected to operate during CY's 2018 and 2019. This site is located northwest of Jackson and north-northeast of Memphis, Tennessee. This site is downwind from the core Memphis MSA. $PM_{2.5}$ monitoring began 08/22/1998 as a part of the original $PM_{2.5}$ state network. An FEM continuous $PM_{2.5}$ sampler replaced the FRM sampler on 04/01/2017. Because of the importance this site serves in assessing the area $PM_{2.5}$ levels outside of the Memphis area, this site was determined to remain in operation over 5 years (2015 through 2020). This site is also employed in the AQI forecasting program and is used to help assess impacts from precursor transport into Tennessee from adjacent states. See Appendix G: Annual Site Evaluations for further details.

Dyersburg Daily Air Quality



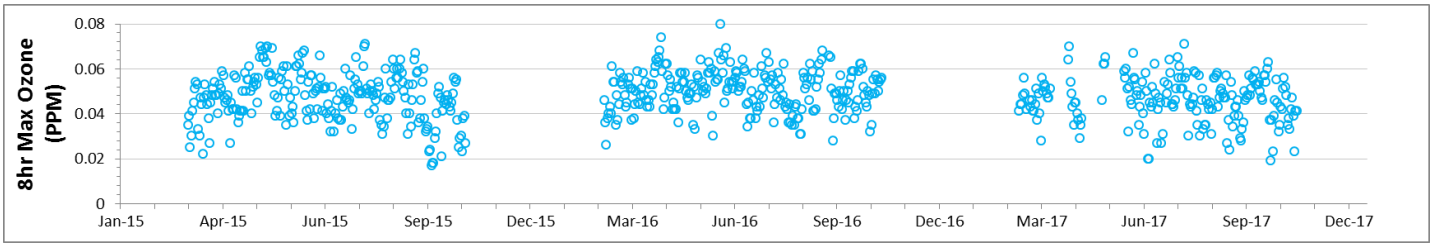
New Market – Jefferson County

Address	2393 Forester Rd, New Market, TN 37820
AQSID	470890002
CBSA	34100
Lat, Lon	36.105629, -83.602077
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	87
FRM/FEM Instrument	Model 400 Ozone Analyzer
Analysis	Ultra Violet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Max Ozone Concentration
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Agricultural
Location Setting	Rural

The New Market site is located in Jefferson County, Tennessee and currently supports monitoring for ozone. The site was initially established in 1999 and is expected to operate during CY's 2018 and 2019. This site is located east-northeast of Knoxville and west southwest of Morristown, Tennessee. This site is downwind from the core Knoxville MSA. Ozone monitoring began 03/01/1999 and this site is used with the ozone AQI forecasting program for verification and to help address transport downwind of the Knoxville CBSA. This site is located in the Morristown MSA and is required to have 1 ozone site and this site meets that requirement. Because of the importance this site serves in assessing the area ozone levels outside and downwind of the Knoxville area, this site was determined to remain in operation over 5 years (2015 through 2020). See Appendix G: Annual Site Evaluations for further details.

In CY 2018, TDEC DAPC plans to replace the existing shelter with a new, upgraded shelter. Due to the logistics of shelter replacement, the site will undergo a reconfiguration. This reconfiguration will result in a new monitoring location approximately 5 meters from the existing site, heading 349° NW. This reconfiguration is subject to EPA approval; more details can be found Appendix G: Annual Site Evaluations & Documentation.

New Market Daily Air Quality



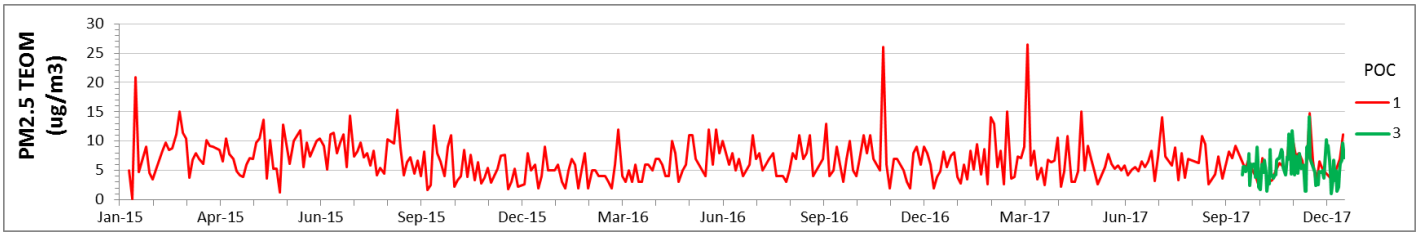
Lawrence – Lawrence County

Address	355 Busby Rd, Loretto, TN 38469
AQSID	470990002
CBSA	29980
Lat, Lon	35.115968, -87.469954
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Upwind background, population exposure
Dominant Source	Area
Measurement Scale	Regional Scale
Land Use Type	Agricultural
Location Setting	Rural

The Lawrence site is located in Lawrence County, Tennessee and currently supports monitoring for $PM_{2.5}$. This site is located on the southern border of Tennessee, north of Alabama. The site is southwest of Nashville and southeast of Jackson, Tennessee. This site is not located near any MSA in Tennessee. $PM_{2.5}$ monitoring began 12/24/1998 as a part of the original $PM_{2.5}$ state network. An FEM continuous $PM_{2.5}$ sampler replaced the FRM sampler on 01/01/2018. This site is also part of the $PM_{2.5}$ AQI forecasting program. This site supported a $PM_{2.5}$ Speciation and URG sampler from 12/03/2001 to 09/26/2014. Because this site serves as a background $PM_{2.5}$ site it was determined to remain in operation over 5 years (2015 through 2020). See Appendix G: Annual Site Evaluations for further details.

In CY 2018, TDEC DAPC will relocate to a new $PM_{2.5}$ monitoring location, approximately 2.85 miles from existing site heading 88° E. This site will continue to operate under an EPA site waiver until a new location is approved by the EPA and is operational. See Appendix F: EPA Request and Approval Letters for the siting waiver from the EPA. See Appendix G: Annual Site Evaluations & Documentation for the proposed $PM_{2.5}$ monitoring site.

Lawrence Daily Air Quality

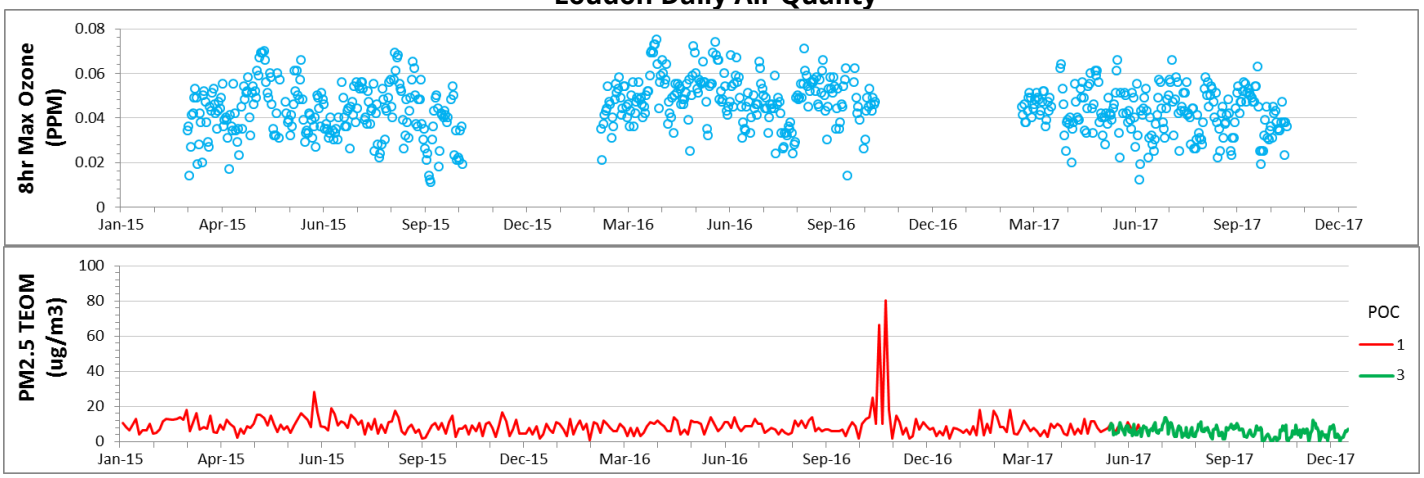


Loudon – Loudon County

Address	2175 Roberts Road, Loudon, TN 37774		
AQSID	471050109		
CBSA	28940		
Lat, Lon	35.721095, -84.343035		
Parameter Code	44201	88101	88101
Parameter Name	O3	PM2.5 Continuous	PM2.5 Continuous
Monitor Type	SLAMS	SLAMS	SLAMS
POC	1	3	4
Int	W	1	1
Year	2014	2017	2018
Collection Frequency	Hourly	Hourly	Hourly
Method	87	209	209
FRM/FEM Instrument	Model 400 Ozone Analyzer	Met One BAM 1022	Met One BAM 1022
Analysis	Ultra Violet Absorption	Real Time Beta Attenuation Mass Monitor	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQOA-0992-087	EQPM-1013-209	EQPM-1013-209
Monitor Objective	Population Exposure	Population Exposure	Population Exposure
Dominant Source	Area		
Measurement Scale	Neighborhood		
Land Use Type	Residential		
Location Setting	Suburban		

The Loudon site is located at 2175 Roberts Road, in Loudon County, TN 37774. The Loudon site supports monitoring for $PM_{2.5}$ and O_3. This site is located southwest of Knoxville and northeast of Chattanooga. This site is upwind of the Knoxville MSA and downwind from the Chattanooga MSA. FEM $PM_{2.5}$ monitoring began on 07/01/2017 as a part of the Loudon air quality study and complaint investigation. The FRM sampler located at 130 Webb Drive, Loudon, TN 37774 (AQS ID 471050108) was retired upon completion of routine correlation testing. A second, collocated FEM sampler was installed and began collecting data on 01/01/ 2018. The Loudon site is serving as the new $PM_{2.5}$ collocated site due to a higher 3-year design value than the previous Jackson collocated site. Monitoring at this site is used by the AQI forecasting program for verification for the Knoxville MSA. In CY 2018, TDEC DAPC plans to replace the existing shelter with a new, upgraded shelter. Due to the logistics of shelter replacement, the site will undergo a reconfiguration. This reconfiguration will result in a new monitoring location approximately 5 meters from the existing site, heading 93° E. This reconfiguration is subject to EPA approval; more details can be found Appendix G: Annual Site Evaluations & Documentation.

Loudon Daily Air Quality

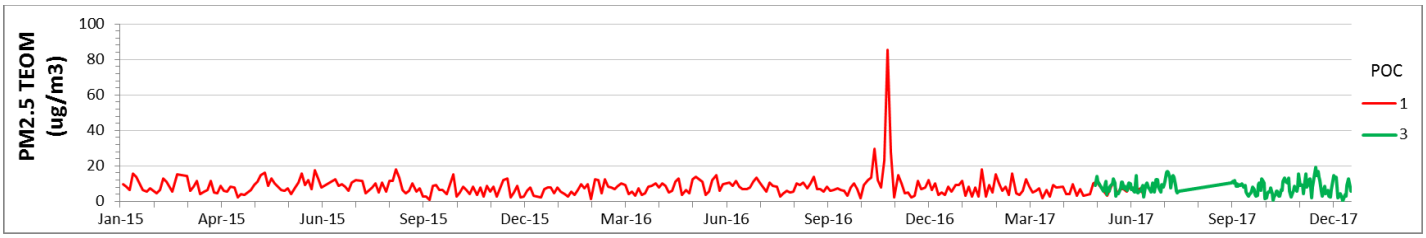


Athens – McMinn County

Address	Saint Mark AME Zion Church: 707 North Jackson St, Athens, TN 37303
AQSID	471071002
CBSA	11940
Lat, Lon	35.450115, -84.596195
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Commercial
Location Setting	Urban And Center City

The Athens site is located in McMinn County, Tennessee and currently supports monitoring for $PM_{2.5}$. This site is located northeast of Chattanooga and southwest of Knoxville, Tennessee. This site is downwind from the Chattanooga MSA and located in the Athens micropolitan area. $PM_{2.5}$ monitoring began 02/03/2000 as a part of the original $PM_{2.5}$ state network. The FEM continuous $PM_{2.5}$ sampler replaced the FRM sampler on 07/01/2017. This site is also part of the $PM_{2.5}$ AQI forecasting program. This site was determined to remain in operation over 5 years (2015 through 2020). This site serves to help quantify air quality in this developing area of the state. See Appendix G: Annual Site Evaluations for further details.

Athens Daily Air Quality

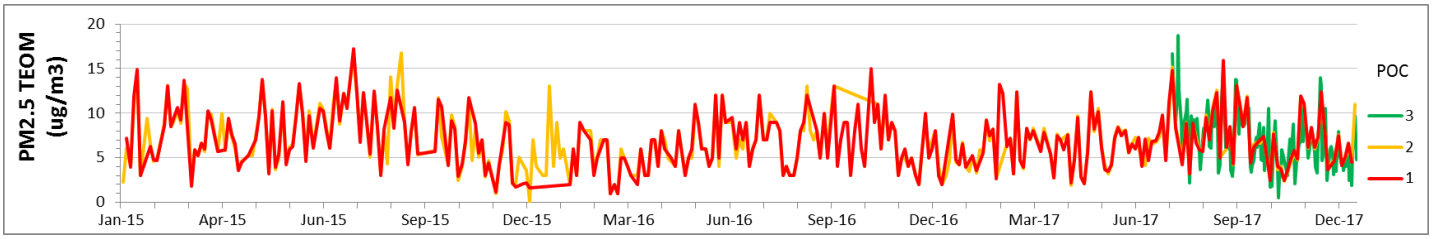


Jackson – Madison County

Address	1371-A North Parkway, Jackson, TN 38301
AQSID	471130006
CBSA	27180
Lat, Lon	35.651349, -88.809578
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Jackson site is located in Madison County, Tennessee and currently supports monitoring for $PM_{2.5}$. This site is located northeast of Memphis and southeast of Dyersburg. This site is located in the Jackson MSA. $PM_{2.5}$ monitoring began 11/17/2004 as a part of the original $PM_{2.5}$ state network. An FEM continuous $PM_{2.5}$ sampler (POC 3) replaced the collocated FRM samplers (POCs 1 and 2) on 01/01/2018. The Jackson MSA has a single FEM continuous $PM_{2.5}$ sampler and is not required to operate any $PM_{2.5}$ sites. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it provides valuable upwind PM2.5 data for the Nashville AQI forecast. See Appendix G: Annual Site Evaluations for further details. In CY 2018, TDEC DAPC will relocate to a new $PM_{2.5}$ monitoring location, approximately 23.8 miles from existing site, heading 351° N. This site will continue to operate under an EPA site waiver until the new location is approved by EPA and is operational. See Appendix F: EPA Request and Approval Letters for the siting waiver from the EPA.

Jackson Daily Air Quality

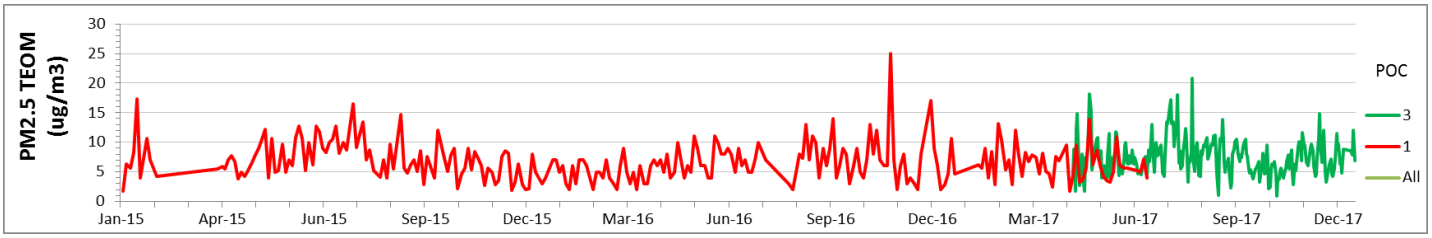


Columbia – Maury County

Address	1600 Nashville Hwy, Columbia, TN
AQSID	471192007
CBSA	34980
Lat, Lon	35.65188, -87.0096
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Commercial
Location Setting	Urban And Center City

The Columbia site is located in Maury County, Tennessee and currently supports monitoring for $PM_{2.5}$. This site is located south-southwest of Nashville and northwest of Lewisburg, Tennessee. This site is located upwind within the Nashville MSA. $PM_{2.5}$ monitoring began 12/25/1998 as a part of the original $PM_{2.5}$ state network. The FEM continuous PM2.5 sampler replaced the FRM sampler on 07/01/2017. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is the only $PM_{2.5}$ site in this region. See Appendix G: Annual Site Evaluations for further details.

Columbia Daily Air Quality



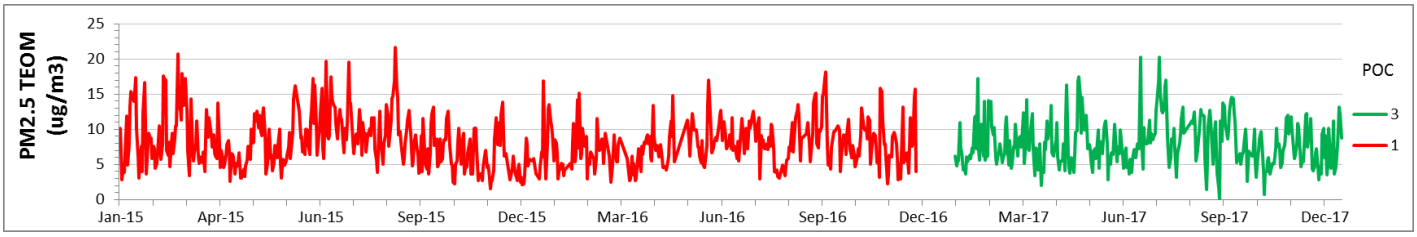
Clarksville – Montgomery County

Address	1514 E. Tompkins Ln, Clarksville, TN 37043
AQSID	471251009
CBSA	17300
Lat, Lon	36.514627, -87.328041
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Clarksville site is located in Montgomery County, Tennessee and currently supports monitoring for $PM_{2.5}$. This site is located northwest of Nashville, Tennessee, located within the Clarksville, TN-KY MSA and is suitable for use in meeting the MSA monitoring requirement for $PM_{2.5}$ for both Tennessee and Kentucky. This site is within the Clarksville city limits. $PM_{2.5}$ monitoring began 01/01/1998 as a part of the original $PM_{2.5}$ state network. This site also assists with the PM fine AQI forecasting program. An FEM continuous PM2.5 sampler replaced the FRM sampler on 01/18/2017. The Clarksville MSA has a single FEM continuous $PM_{2.5}$ sampler and is not required to operate a $PM_{2.5}$ site for the MSA. This site will be moved to a new location within the city of Clarksville. The new site will remain in operation over 5 years (2018 through 2023) primarily because it is the only $PM_{2.5}$ site in the MSA. See Appendix G: Annual Site Evaluations for further details.

Tennessee has determined to relocate the site due to the difficulties related to the site's elevated platform and to ensure compliance with siting criteria. By January 1, 2019, TDEC DAPC will relocate to a new $PM_{2.5}$ monitoring location, approximately 8.4 miles from existing site, heading 335° NW. See Appendix G: Annual Site Evaluations & Documentation for documentation for new $PM_{2.5}$ monitoring site.

Clarksville Daily Air Quality

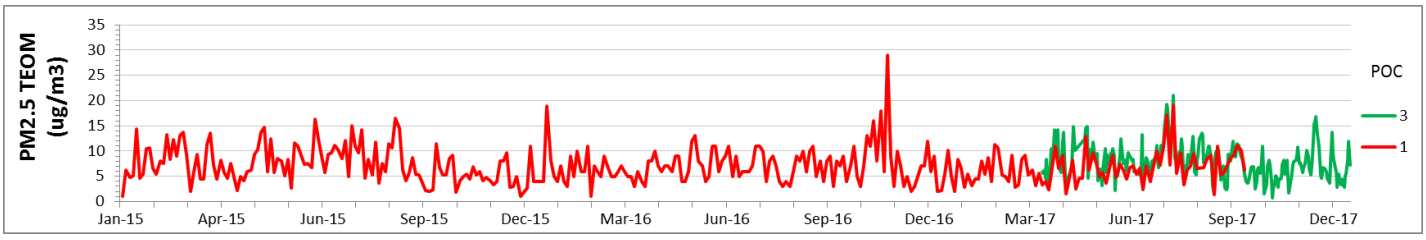


Cookeville – Putnam County

Address	630 East 20th Street, Cookeville TN 38501
AQSID	471410005
CBSA	18260
Lat, Lon	36.185702, -85.492107
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Cookeville site is located in Putnam County, Tennessee and currently supports monitoring for $PM_{2.5}$. This site is located east of Nashville, on the Highland Rim, just west of the Cumberland Plateau. This site is not located in or near an MSA but is within the largest micropolitan statistical area in the state. $PM_{2.5}$ monitoring began 08/15/2006 after the site was relocated. An FEM continuous PM2.5 sampler replaced the FRM sampler on 04/01/2017. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is the only $PM_{2.5}$ site in this region. See Appendix G: Annual Site Evaluations for further details.

Cookeville Daily Air Quality

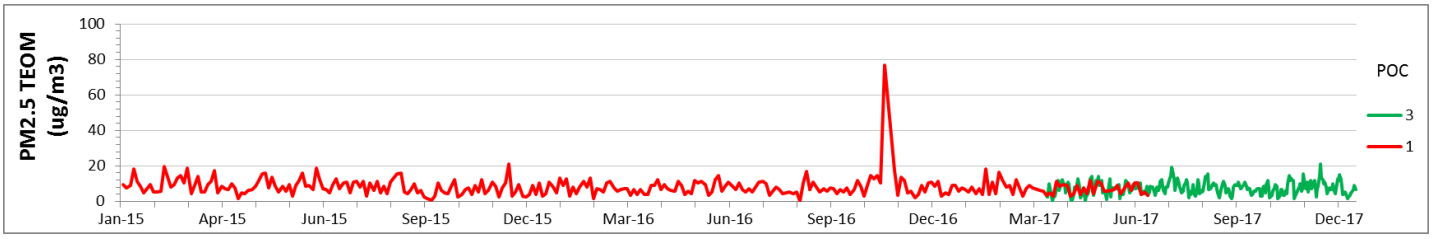


Harriman – Roane County

Address	Harriman High: 1002 N. Roane St., Harriman, TN 37748
AQSID	471450004
CBSA	28940
Lat, Lon	35.939078, -84.542802
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SPM
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban
Land Use Type	Industrial
Location Setting	Suburban

The Harriman site is located in Roane County, Tennessee and currently supports monitoring for $PM_{2.5}$. This site is located west of Knoxville and west-southwest of Oak Ridge, Tennessee. This site is upwind from the Knoxville MSA. $PM_{2.5}$ monitoring began on 01/01/1998 as a part of the original $PM_{2.5}$ state network. This site is also part of the $PM_{2.5}$ AQI forecasting program. An FEM continuous $PM_{2.5}$ sampler replaced the FRM sampler on 04/01/2017. This site was determined to remain in operation over 5 years (2015 through 2020). The Knoxville MSA has six operating $PM_{2.5}$ FRM sites and is required to have only two. See Appendix G: Annual Site Evaluations for further details.

Harriman Daily Air Quality

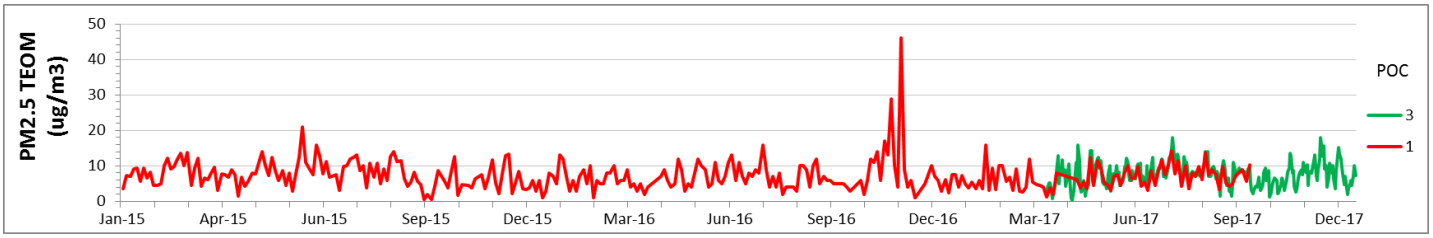


Kingsport ($PM_{2.5}$) – Sullivan County

Address	1649 D Street Kingsport TN 37664
AQSID	471631007
CBSA	28700
Lat, Lon	36.538761 , -82.521599
Parameter Code	88101
Parameter Name	$PM_{2.5}$ Continuous
Monitor Type	SLAMS
POC	3
Int	1
Collection Frequency	Hourly
Method	209
FRM/FEM Instrument	Met One BAM 1022
Analysis	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQPM-1013-209
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Kingsport site is located in Sullivan County, Tennessee and currently supports monitoring for $PM_{2.5}$. This site is located in the far northeast corner of the state and is south of the state of Virginia. This site is upwind of Gate City, VA and located within the Kingsport-Bristol-Bristol, Tennessee-Virginia MSA, in the Kingsport city limits. $PM_{2.5}$ monitoring began 10/01/1998 as a part of the original $PM_{2.5}$ state network. This site is also part of the $PM_{2.5}$ AQI forecasting program. An FEM continuous PM2.5 sampler replaced the FRM sampler on 04/01/2017. The Kingsport MSA has a single FEM continuous $PM_{2.5}$ sampler and is not required to operate a $PM_{2.5}$ site for the MSA. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is the only $PM_{2.5}$ site in this region. See Appendix G: Annual Site Evaluations for further details.

Kingsport (PM2.5) Daily Air Quality



Blountville – Sullivan County

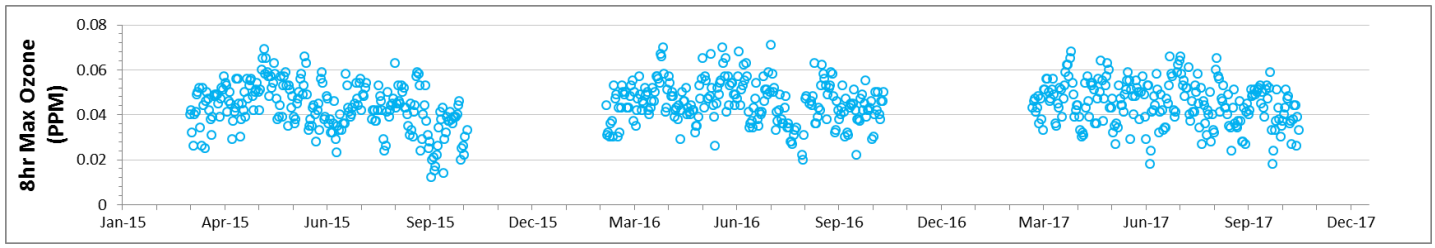
Address	Indian Springs School Shawnee Drive Blountville, TN 37664
AQSID	471632002
CBSA	28700
Lat, Lon	36.541365, -82.424555
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	87
FRM/FEM Instrument	Model 400 Ozone Analyzer
Analysis	Ultra Violet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Rural

The Blountville site is located in Sullivan County, Tennessee and currently supports monitoring for ozone. This site is located east of Kingsport, near Blountville, TN. This site is downwind from the city of Kingsport.

Ozone monitoring began 01/01/1980 and this site is used with the ozone AQI forecasting program for verification and to help address the ozone impacts in the Kingsport-Bristol-Bristol Tennessee-Virginia and Johnson City MSAs. The Kingsport MSA has two ozone sites operating and is required to have only one ozone site. See Appendix G: Annual Site Evaluations for further details.

In CY 2018, TDEC DAPC plans to replace the existing shelter with a new, upgraded shelter. Due to the logistics of shelter replacement, the site will undergo a reconfiguration. This reconfiguration will result in a new monitoring location approximately 5 meters from the existing site, heading 186° S. This reconfiguration is subject to EPA approval; more details can be found Appendix G: Annual Site Evaluations & Documentation.

Blountville Daily Air Quality



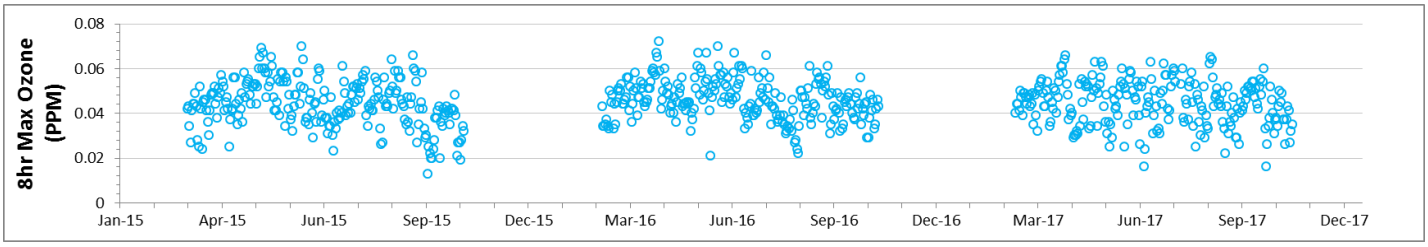
Kingsport O_3 – Sullivan County

Address	3301 Bloomingdale Rd. Kingsport TN 37660
AQSID	471632003
County Name	Sullivan
CBSA	28700
Lat, Lon	36.58211, -82.485742
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	87
FRM/FEM Instrument	Model 400 Ozone Analyzer
Analysis	Ultra Violet Absorption
Ref Mtd ID	EQOA-0992-087
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Residential
Location Setting	Suburban

The Kingsport site is located in Sullivan County, Tennessee and currently supports monitoring for ozone. This site is located in the far northeast corner of the state and is south of the State of Virginia near the Tennessee-Virginia line. This site is upwind of Gate City, VA and downwind of the Kingsport city limits. Kingsport is also a part of the Kingsport-Bristol-Bristol Tennessee-Virginia MSA and is conducted for the AQI forecasting program. Ozone monitoring began on 04/01/1995. The Kingsport MSA has two ozone sites operating and is required to have only one ozone site. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because of its location within the Kingsport-Bristol-Bristol MSA. See Appendix G: Annual Site Evaluations for further details.

In CY 2018, TDEC DAPC plans to replace the existing shelter with a new, upgraded shelter. Due to the logistics of shelter replacement, the site will undergo a reconfiguration. This reconfiguration will result in a new monitoring location approximately 5 meters from the existing site, heading 87° E. This reconfiguration is subject to EPA approval; more details can be found in Appendix G: Annual Site Evaluations & Documentation.

Kingsport Daily Air Quality

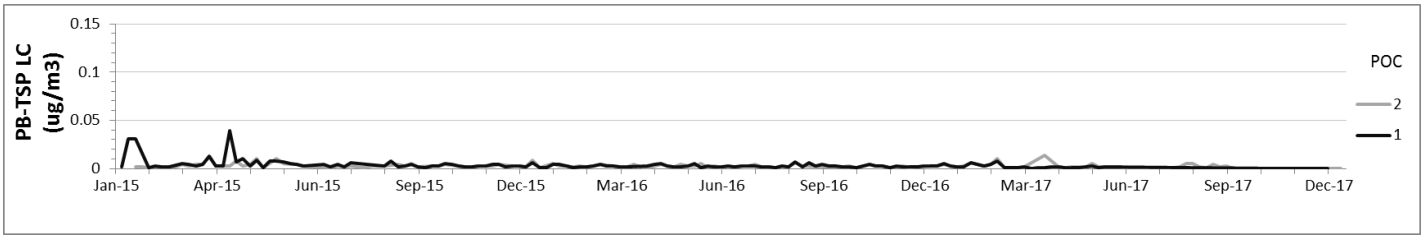


Exide – Sullivan County

Address	364 Exide Drive, Bristol TN 37620	
AQSID	471633004	
County Name	Sullivan	
CBSA	28700	
Lat, Lon	36.524433, -82.27261	
Parameter Code	14129	14129
Parameter Name	Pb	Pb
Monitor Type	SLAMS	SLAMS
POC	1	2
Int	7	7
Collection Frequency	1 In 6	1 In 6
Method	192	192
FRM/FEM Instrument	Pb-TSP/ICP Spectra (ICP-MS)	Pb-TSP/ICP Spectra (ICP-MS)
Analysis	Inductively Coupled Plasma-Mass Spectrometry Acid Filter Extract With Hot Nitric Acid	Inductively Coupled Plasma-Mass Spectrometry Acid Filter Extract With Hot Nitric Acid
Ref Mtd ID	EQL-0710-192	EQL-0710-192
Monitor Objective	Source Oriented	
Dominant Source	Point	
Measurement Scale	Urban Scale	
Land Use Type	Industrial	
Location Setting	Urban And Center City	

The Exide site is located in Sullivan County, Tennessee and currently supports monitoring for lead. This site is located east of Kingsport and northeast of Blountville on the Tennessee Virginia state lines. This site is downwind from Johnson City and Blountville and is located in the Kingsport Bristol MSA. Lead monitoring began on 01/01/2010 to verify lead NAAQS compliance at a lead battery plant that is now shutdown. The POC 2 monitor serves as the site's collocated monitor. This area is now classified as an attainment area for lead. The former lead source has surrendered its air permits and shut down. See Appendix G: Annual Site Evaluations for further details.

Exide Daily Air Quality

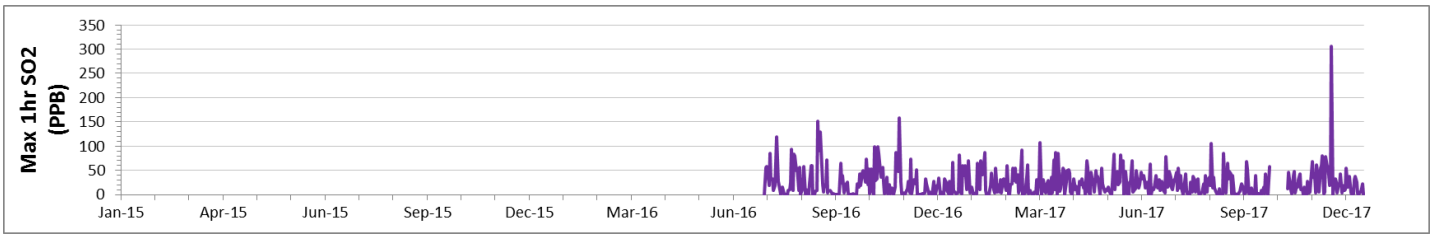


Ross N Robinson – Sullivan County

Address	Wilburn Drive, Kingsport, TN 37664
AQSID	471636001
County Name	Sullivan
CBSA	28700
Lat, Lon	36.532616, -82.516306
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	Teledyne T100 SO2 Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Source Oriented
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Ross N Robinson site is located in Sullivan County, Tennessee and currently supports monitoring for SO_2. The Ross N Robinson monitor is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant and became operational in July 2016. This monitor is one of two monitors that satisfy PWEI requirements for the Kingsport, TN CBSA and secondly, to characterize the maximum expected concentrations in the nonattainment area.

Ross N Robinson Daily Air Quality

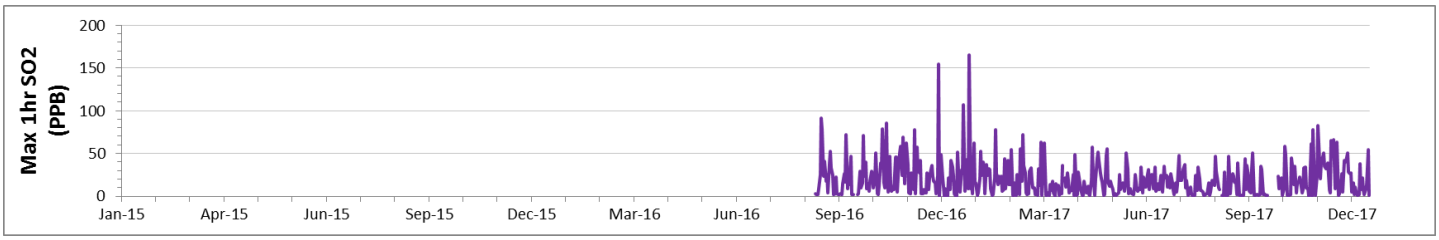


Skyland Dr. – Sullivan County

Address	Skyland Drive at Bagwell St., Kingsport, TN
AQSID	471636002
County Name	Sullivan
CBSA	28700
Lat, Lon	36.521066, -82.502454
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	100
FRM/FEM Instrument	Api Model 100 E SO2 Analyzer
Analysis	Ultraviolet Fluorescence
Ref Mtd ID	EQSA-0495-100
Monitor Objective	Population Exposure
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Skyland Drive ambient air monitoring site is located in Sullivan County, Tennessee and currently supports monitoring for SO_2. The site is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant and became operational in September 2016. The monitor was established in order to characterize the maximum expected concentrations in the nonattainment area. This monitor is one of two monitors that satisfy PWEI requirements for the Kingsport, TN CBSA and secondly, to characterize the maximum expected concentrations in the nonattainment area.

Skyland Dr. Daily Air Quality



Andrew Johnson Elementary School – Sullivan County

Address	1001 Ormond Drive, Kingsport, TN
AQSID	471636003
County Name	Sullivan
CBSA	28700
Lat, Lon	To be supplied
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	To be supplied
FRM/FEM Instrument	To be supplied
Analysis	To be supplied
Ref Mtd ID	To be supplied
Monitor Objective	Population Exposure
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

The Andrew Johnson Elementary School ambient air monitoring site is located in Sullivan County, Tennessee and currently supports monitoring for SO_2. The site is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant and will become operational in late 2018. The monitor will be established in order to characterize the maximum expected concentrations in the nonattainment area.

Happy Hill Road – Sullivan County

Address	2105 Happy Hill Road, Kingsport, TN
AQSID	471636004
County Name	Sullivan
CBSA	28700
Lat, Lon	To be supplied
Parameter Code	42401
Parameter Name	SO_2
Monitor Type	SLAMS
POC	1
Int	1
Collection Frequency	Hourly
Method	To be supplied
FRM/FEM Instrument	To be supplied
Analysis	To be supplied
Ref Mtd ID	To be supplied
Monitor Objective	Population Exposure
Dominant Source	Point
Measurement Scale	Urban Scale
Land Use Type	Residential
Location Setting	Suburban

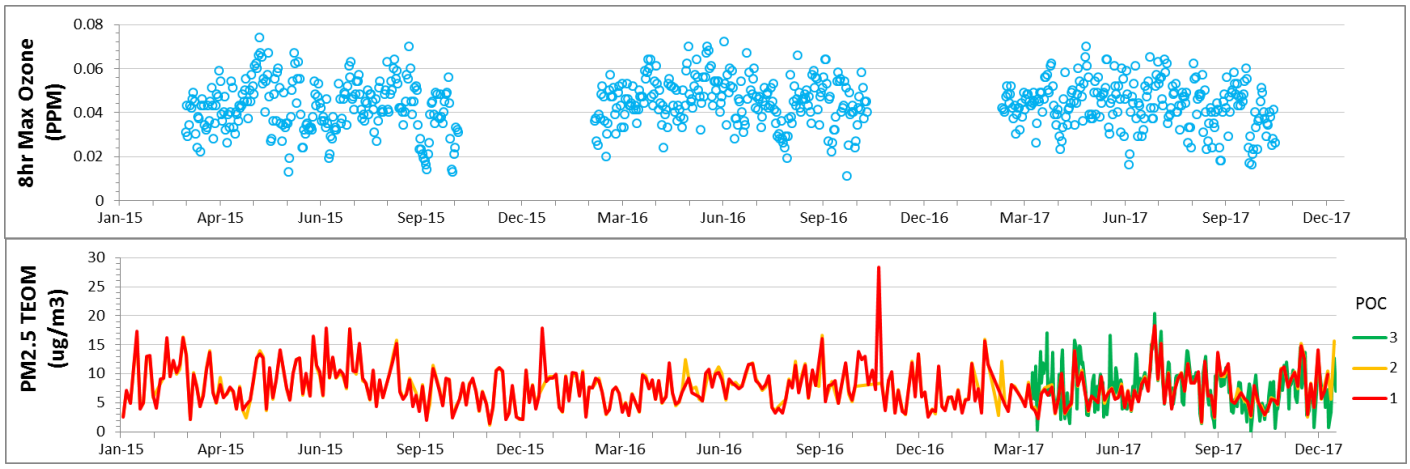
The Happy Hill Road ambient air monitoring site is located in Sullivan County, Tennessee and currently supports monitoring for SO_2. The site is located within the 3-km SO_2 nonattainment area surrounding the Tennessee Eastman Chemical Plant and will become operational in late 2018. The monitor will be established in order to characterize the maximum expected concentrations in the nonattainment area.

Hendersonville - Sumner County

Address	Rockland Recreational Area, Old Hickory Dam, Hendersonville, TN		
AQSID	471650007		
CBSA	34980		
Lat	36.29756, -86.653137		
Parameter Code	44201	88101	88101
Parameter Name	O_3	$PM_{2.5}$	$PM_{2.5}$ Continuous
Monitor Type	SLAMS	SLAMS	SLAMS
POC	1	1	3
Int	W	7	1
Collection Frequency	Hourly	1 in 3	Hourly
Method	047	118	209
FRM/FEM Instrument	Thermo Electron 49	R&P Co Plus Model 2025	Met One BAM 1022
Analysis	Ultra violet	Gravimetric	Real Time Beta Attenuation Mass Monitor
Ref Mtd ID	EQOA-0880-047	RFPS-0498-118	EQPM-1013-209
Monitor Objective	Highest Conc	Population Exposure	
Dominant Source	Area	Area	
Measurement Scale	Neighborhood	Neighborhood	
Land Use Type	Industrial	Industrial	
Location Setting	Rural	Rural	

The Hendersonville site is located in Sumner County, Tennessee and currently supports monitoring for ozone and PM2.5. This site is located northeast of Nashville and west southwest of Gallatin, Tennessee. This site is downwind from Nashville and is considered part of the Nashville MSA. Ozone monitoring began 01/01/1973 and is conducted for the ozone AQI forecasting program for verification and to help address NAAQS compliance in the Nashville MSA. $PM_{2.5}$ monitoring began 10/01/1998 as a part of the original $PM_{2.5}$ state network. This site is also part of the PM fine AQI forecasting program. An FEM continuous $PM_{2.5}$ sampler replaced the collocated FRM sampler on 01/01/2018. This site was determined to remain in operation over 5 years (2015 through 2020) primarily because it is the ozone DV site for the Nashville MSA and is downwind from the Nashville fine particulate precursor sources. The Nashville MSA has 5 ozone monitors operating and is only required to have 2. See Appendix G: Annual Site Evaluations for further details. In CY 2018, TDEC DAPC plans to replace the existing shelter with a new, upgraded shelter. The new shelter will be placed in the same location as the existing shelter.

Hendersonville Daily Air Quality



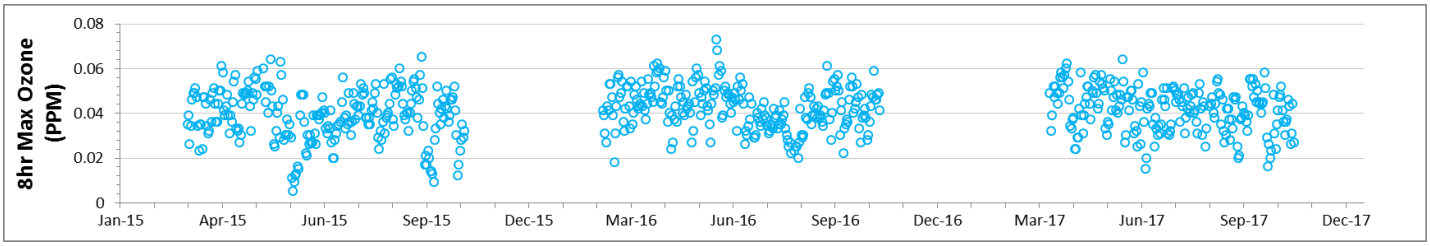
Fairview –Williamson County

Address	Fairview Middle School: 7200 Cumberland Dr, Fairview, TN
AQSID	471870106
CBSA	34980
Lat, Lon	35.949765, -87.138246
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultra Violet
Ref Mtd ID	EQOA-0880-047
Monitor Objective	Population Exposure
Dominant Source	Area
Measurement Scale	Urban Scale
Land Use Type	Agricultural
Location Setting	Rural

The Fairview site is located in Williamson County, Tennessee and currently supports monitoring for ozone. This site is located southwest of Nashville and northwest of Franklin, Tennessee. This site is upwind from the core Nashville MSA. Ozone monitoring began on 10/30/2001 is conducted for the ozone AQI forecasting program for verification and to help address upwind ozone concentrations entering the Nashville MSA. The Nashville MSA has 5 ozone sites operating and is only required to have 2. Due to this site's importance in assessing the area ozone levels outside and upwind of the Nashville area, it was determined to remain in operation over 5 years (2015 through 2020). See Appendix G: Annual Site Evaluations for further details.

In CY 2018, TDEC DAPC plans to replace the existing shelter with a new, upgraded shelter. Due to the logistics of shelter replacement, the site will undergo a reconfiguration. This reconfiguration will result in a new monitoring location approximately 5 meters from the existing site, heading 311° W. This reconfiguration is subject to EPA approval; more details can be found in Appendix G: Annual Site Evaluations & Documentation.

Fairview Daily Air Quality



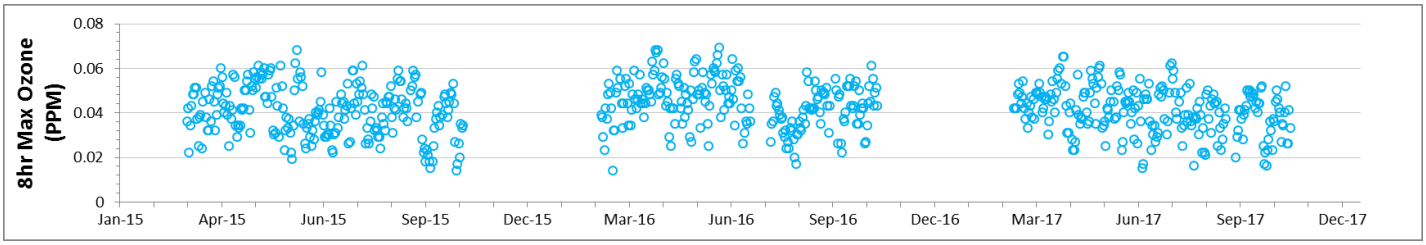
Cedars of Lebanon – Wilson County

Address	Cedar Forest Rd., Lebanon, TN
AQSID	471890103
CBSA	34980
Lat, Lon	36.060833, -86.286261
Parameter Code	44201
Parameter Name	O_3
Monitor Type	SLAMS
POC	1
Int	W
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultra Violet
Ref Mtd ID	EQOA-0880-047
Monitor Objective	Highest Concentration
Dominant Source	Area
Measurement Scale	Urban Scale
Land Use Type	Forest
Location Setting	Rural

The Cedars site is located in Wilson County, Tennessee and currently supports monitoring for ozone. This site is located east of Nashville and north of Murfreesboro, Tennessee. This site is downwind from Franklin, Tennessee and is located within the Nashville MSA. Ozone monitoring began 05/01/1988 and is conducted for the ozone AQI forecasting program for verification and to help address downwind ozone levels in the Nashville MSA. The Nashville MSA has five ozone sites operating and is only required to have two. Because of the importance that this site serves in assessing the area ozone levels outside and downwind of the Nashville area, this site was determined to remain in operation over 5 years (2015 through 2020). See Appendix G: Annual Site Evaluations for further details.

In CY 2018, TDEC DAPC plans to replace the existing shelter with a new, upgraded shelter. Due to the logistics of shelter replacement, the site will undergo a reconfiguration. This reconfiguration will result in a new monitoring location approximately 5 meters from the existing site, heading 352° N. This reconfiguration is subject to EPA approval; more details can be found in Appendix G: Annual Site Evaluations & Documentation.

Cedars Daily Air Quality



National Park Service Monitors

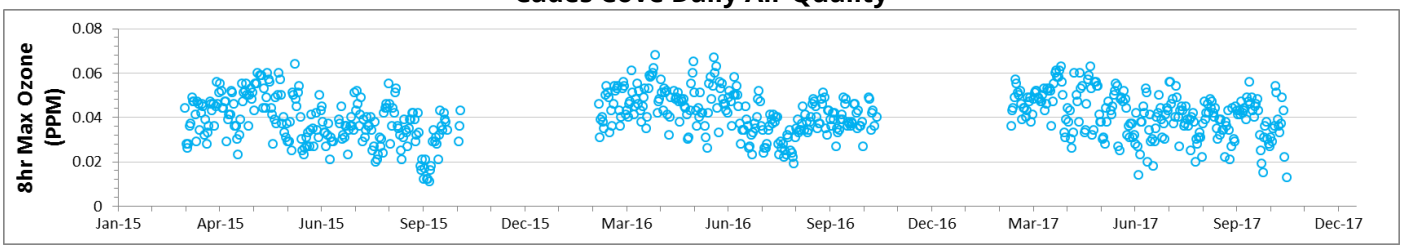
The NPS air monitoring sites are included as a courtesy to the readers of the TDEC DAPC 2018 ANMP. These sites are included because they are collecting and reporting data previously used for attainment decisions in Tennessee and that can be used for future determinations. The NPS sites are not a part of the TDEC DAPC air monitoring networks and TDEC DAPC does not report their data to the EPA AQS data systems; however, these data may continue to be used to support air quality forecasting by TDEC in the area.

Cades Cove – Blount County (GSM NP)

Address	Great Smoky Mountains NP - Cades Cove
AQSID	470090102
CBSA	28940
Lat, Lon	35.603056, -83.783611
Parameter Code	44201
Parameter Name	O_3
Monitor Type	Non-EPA Federal
POC	1
Int	W
Collection Frequency	Hourly
Method	53
FRM/FEM Instrument	Monitor Labs 8810
Analysis	Ultra Violet
Ref Mtd ID	EQOA-0881-053
Monitor Objective	Highest Concentration
Dominant Source	0
Measurement Scale	Regional Scale
Land Use Type	Forest
Location Setting	Rural

The Cades Cove site is located in Blount County, Tennessee and currently supports monitoring for ozone and meteorological parameters. The site was initially established in 05/01/1994. This site is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is within and southeast of the Knoxville MSA. This site is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP. It is the responsibility of the NPS to operate, maintain, and conduct all QA/QC activities at this site in accordance with 40 CFR Part 58. The National Park Service is responsible for verifying, validating and certifying the ozone data collected.

Cades Cove Daily Air Quality

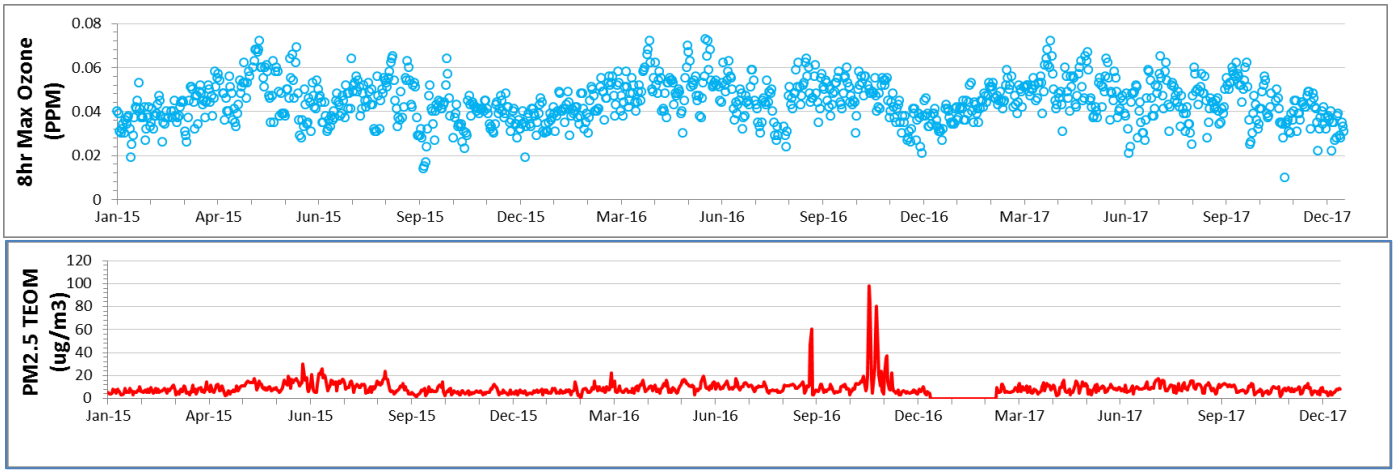


Look Rock – Blount County (GSM NP)

Address	Great Smoky Mountains NP Look Rock	
AQSID	470090101	
CBSA	28940	
Lat, Lon	35.6334799, -83.941605999999993	
Parameter Code	44201	88501
Parameter Name	O_3	$PM_{2.5}$ Continuous
Monitor Type	SLAMS	SPM
POC	1	3
Int	W	1
Collection Frequency	Hourly	Hourly
Method	053	716
FRM/FEM Instrument	Monitor Labs 8810	None
Analysis	Ultra Violet	TEOM Gravimetric 50 deg C
Ref Mtd ID	EQOA-0881-053	None
Monitor Objective	General Background	
Dominant Source	0	
Measurement Scale	0	
Land Use Type	Forest	
Location Setting	Rural	

The Look Rock site is located in Blount County, Tennessee and currently supports monitoring for ozone and other pollutants. The site was initially established in 1980. This site is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is within and southeast of the Knoxville MSA. Ozone monitoring began on 07/23/1998 and $PM_{2.5}$ monitoring began on 05/01/2002. The Look Rock site is used with the PM Fine AQI forecasting program for verification and to help address fine particulate levels found in the GSMNP area. This site is operated and maintained by the NPS. The NPS is responsible for verifying, validating and certifying the ozone data collected.

Look Rock Daily Air Quality

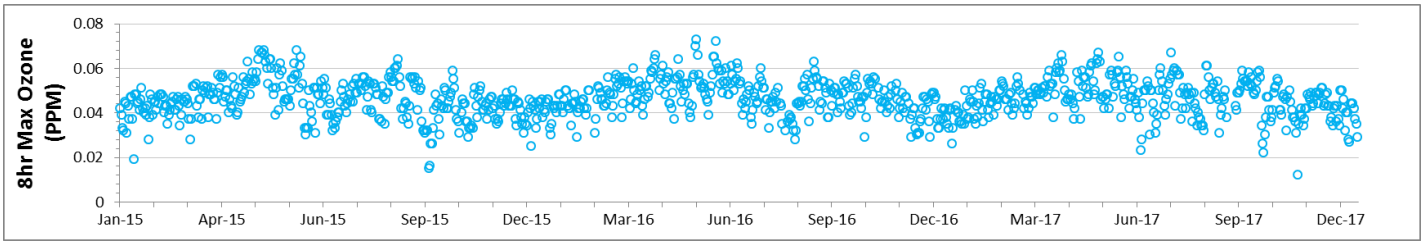


Cove Mountain – Sevier Country (GSM NP)

Address	Great Smoky Mountain NP- Cove Mountain
AQSID	471550101
CBSA	42940
Lat, Lon	35.6966669999999, -83.609722
Parameter Code	44201
Parameter Name	O_3
Monitor Type	NON-EPA FEDERAL
POC	1
Int	W
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultra Violet
Ref Mtd ID	EQOA-0880-047
Monitor Objective	General/Background
Dominant Source	Area
Measurement Scale	Neighborhood
Land Use Type	Forest
Location Setting	Rural

The Cove Mt. site is located in Sevier County, Tennessee and currently supports monitoring for ozone and meteorological parameters. This site is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is outside and southeast of the Knoxville MSA. Ozone monitoring began on 07/01/1988. This site is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP area. This site is operated and maintained by the NPS. The NPS is responsible for verifying, validating and certifying the ozone data collected.

Cove Mountain Daily Air Quality

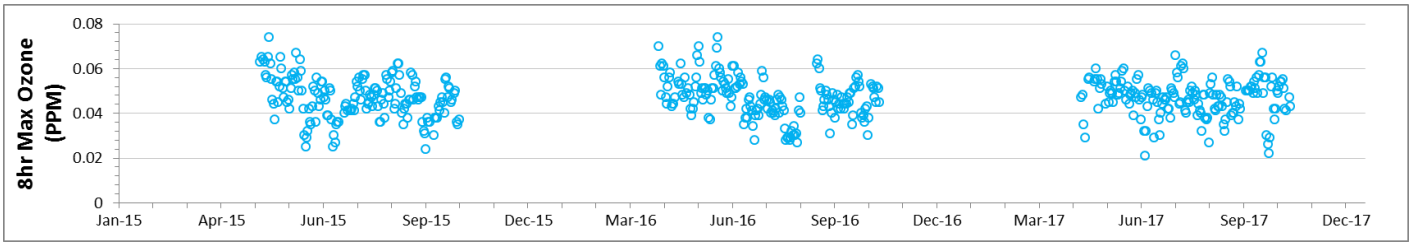


Clingman's Dome – Sevier County (GSM NP)

Address	Great Smoky Mountain Np Clingman's Dome
AQSID	471550102
CBSA	42940
Lat, Lon	35.562778, -83.4981
Parameter Code	44201
Parameter Name	O_3
Monitor Type	NON-EPA FEDERAL
POC	1
Int	W
Year	2014
Collection Frequency	Hourly
Method	47
FRM/FEM Instrument	Thermo Electron 49
Analysis	Ultra Violet
Ref Mtd ID	EQOA-0880-47
Monitor Objective	Highest Concentration
Dominant Source	Area
Measurement Scale	Regional Scale
Land Use Type	Forest
Location Setting	Rural

The Clingman's Dome site is located in Sevier County, Tennessee and currently supports monitoring for ozone and meteorological parameters. This site is located within the Tennessee portion of the Great Smoky Mountains National Park. This site is outside and southeast of the Knoxville MSA. Ozone monitoring began 04/01/1993. This site is used with the ozone AQI forecasting program for verification and to help address ozone levels found in the GSMNP area. This site is located at the highest point inside of Tennessee and is on the border of Tennessee and North Carolina. The elevation of the site poses challenges in maintenance and access as the site is often impacted in the late fall and through-out the winter and spring by excessive snow fall and icing events that prevent access to the site. The ozone data collection season at this site is truncated due to the site access issues in March and April and in some years in October due to early snowfall events. This site is operated and maintained by the NPS. The NPS is responsible for verifying, validating and certifying the ozone data collected.

Clingman's Dome Daily Air Quality



Tennessee Geographic Regions, Descriptions and Climate

Topographic Features - The topography of Tennessee is quite varied, stretching from the lowlands of the Mississippi Valley to the mountain peaks in the east. The westernmost part of the state, between the bluffs overlooking the Mississippi River and western valley of the Tennessee River, is a region of gently rolling plains sloping gradually from 200 to 250 feet in the west to about 600 feet above sea level in the hills overlooking the Tennessee River. The hilly Highland Rim, in a wide circle touching the Tennessee River Valley in the west and the Cumberland Plateau in the east, together with the enclosed Central Basin make up the whole of Middle Tennessee. The Highland Rim ranges from about 600 feet in elevation along the Tennessee River to 1,000 feet in the east and rises 300 to 400 feet above the Central Basin which is a rolling plain of about 600 feet average elevation, but with a crescent of hills reaching to over 1,000 feet south of Nashville. The Cumberland Plateau, with an average elevation of 2,000 feet extends roughly northeast-southwest across the state in a belt 30 to 50 miles wide, being bounded on the west by the Highland Rim and overlooking the Great Valley of East Tennessee on the east. The Great Valley, paralleling the Plateau to the west and the Great Smoky Mountains to the east, is a funnel shaped valley varying in width from about 30 miles in the south to about 90 miles in the north. Within the valley, which slopes from 1,500 feet in the north to 700 feet in the south, is a series of northeast-southwest ridges. Along the Tennessee-North Carolina border lie the Great Smoky Mountains, the most rugged and elevated portion of Tennessee, with numerous peaks from 4,000 to 6,000 feet.

Tennessee, except for a small area east of Chattanooga, lies entirely within the drainage of the Mississippi River system. The extreme western section of the state is drained through several relatively small rivers directly into the Mississippi River. Otherwise, drainage is into either the Cumberland or Tennessee Rivers, both of which flow northward near the end of their courses to join the Ohio River along the Kentucky-Illinois border. The Cumberland River, which drains north-central portions of Tennessee rises in the Cumberland Mountains in Kentucky, flows southwestward, then south into Tennessee reaching the Nashville area before tuning northward to re-enter Kentucky. The Tennessee River is formed by the juncture of the Holston and French Broad rivers at Knoxville. It flows southwesterly along the Alabama-Mississippi line, and then flows northward across the state into Kentucky. Besides the headwater streams, other important tributaries include the: Clinch, Little Tennessee, Hiawassee, Elk and Duck Rivers.

Temperature - Most aspects of the state's climate are related to the widely varying topography within its borders. The decrease of temperature with elevation is quite apparent, amounting to, on the average, three degrees Fahrenheit (°F) per 1,000 feet increase in elevation. Thus higher portions of the state, such as the Cumberland Plateau and the mountains of the east, have lower average temperature than the Great Valley of East Tennessee, which they flank, and other lower parts of the state. In the Great Valley temperature increases from north to south, reaching a value at the south end comparable to that of Middle and West Tennessee where elevation variations are a generally minor consideration. Across the state, the average annual temperature varies from over 62° F in the extreme southwest to near 45 degrees atop the highest peaks of the east. It is of interest to note that average January temperature atop a 6,000 foot peak in the Great Smoky Mountains is equivalent to that in Central Ohio, while average July temperature is duplicated along the southern edge of the Hudson Bay in Canada. While most of the state can be described as having warm, humid summers and mild winters, this must be qualified to include variations with elevation. Thus with increasing elevation, summers become cooler and more pleasant while winters become colder and more blustery.

This dependence of temperature on elevation is of considerable importance to a variety of interests. Temperature, together with precipitation, plays an important role in determination what plant and animal life are adaptable to the area. In the Great Smoky Mountains, for example, the variations in elevation from 1,000 to 6,000 feet with attendant variations in temperature contribute to a remarkable variety of plant life. The relative coolness of the mountains also contributes to the popularity of that area during the warmer part of the year.

Length of growing season is linked to topography in a way similar to temperature, varying from an average of 237 days at low-lying Memphis to a near 130 days on the highest mountains in the east. Most of the state is included in the range of 180 to 220 days. Shorter growing seasons than this are confined to the mountains forming the state's eastern border and to the northern part of the Cumberland Plateau. Longer growing seasons are found in counties bordering the Mississippi River, parts of the Central Basin of the Middle Tennessee, and the southern end of the Great Valley of East Tennessee.

Precipitation - Since the principal source of moist air for this area is the Gulf of Mexico, there exists a gradual decrease of average precipitation from south to north. This effect is largely obscured however, by the overruling influence of topography. Air forced to ascend, cools and condenses out a portion of its moisture. Thus, average precipitation ranges from 46 to 54 inches, increasing from Mississippi bottomlands to the slight hills farther east. In Middle Tennessee the variation is from a minimum of 45 inches in the Central Basin to 50 to 55 inches in the surrounding hilly Highland Rim. Over the elevated Cumberland Plateau average annual precipitation is generally from 50 to 55 inches. In contrast, average annual precipitation in the Great Valley of East Tennessee increases from near 40 inches in northern portions to over 50 inches in the south. The northern minimum, lowest for the entire state, results from the shielding influence of the Great Smoky Mountains to the southeast and the Cumberland Plateau to the northwest. The mountainous eastern border of the state is the wettest, having average annual precipitation ranging up to 80 inches on the higher, and well-exposed peaks of the Great Smoky Mountains.

Over most of the state, the greatest precipitation occurs during the winter and early spring due to the more frequent passage of large-scale storms over and near the state during those months. A secondary maximum of precipitation occurs in midsummer in response to thunderstorm activity. This is especially pronounced in the mountains of the east where July rainfall exceeds the precipitation of any other month. Lightest precipitation, observed in the fall, is brought about by the maximum occurrence of slow moving, rain suppressing high pressure areas. Although all parts of Tennessee are generally well supplied with precipitation, there occurs on the average one or more prolonged dry spells each year during summer and fall. Studies illustrate the beneficial effects of supplemental irrigation of crops, despite usually bountiful annual precipitation.

Average annual snowfall varies from four to six inches in the southern and western parts of the state and in most of the Great Valley of East Tennessee to more than 10 inches over the northern Cumberland Plateau and the mountains of the east. Over most of the state, due to relatively mild winter temperatures, snow cover rarely persists for more than a few days.

The most important flood season is during the winter and early spring when the frequent migratory storms bring general rains of high intensity. During this period both widespread flooding and local flash floods can occur. During the summer, heavy thunderstorm rainfalls frequently result in local flash flooding. In the fall, while flood producing rains are rare, a decadent tropical system on occasion causes serious floods. The numerous dams constructed along the Tennessee and Cumberland rivers are major features in the control of flood waters in the state.

The dams of the Tennessee and Cumberland River systems and the lakes so formed, in addition to vastly reducing flood damage have: facilitated water transportation, provided abundant low cost hydroelectric power and created extensive recreation areas. Fishing, boating, swimming and camping along the many lakes, together with the several state and national parks, have made tourism one of the major industries in the state.

Climate and the Economy - Water resources of Tennessee have been a major factor in the state's industrial growth. The bountiful and good quality water supply has influenced the location of industry, especially chemical processing plants. Three major waterways, the Mississippi, Cumberland and Tennessee Rivers, are suitable for commercial traffic. Finally, the availability of low cost hydroelectric power from the multipurpose dams of the

Cumberland and Tennessee rivers and tributaries has been stimulus to industry of all types. The principal types of manufacturing products are: textile mill products, primary metals, fabricated metals and lumber products.

Although surpassed in monetary value by industrial activity, agriculture remains a vital feature of Tennessee's economic life. The wide range of climates in Tennessee, from river bottom to mountaintop, coupled with a wide range of soils, has resulted in a large number of crops which thrive in the state.

Forests represent an additional important segment of Tennessee's natural resources related to the climate of the state. Timberland, containing principally hardwood types, covers approximately one-half of the total area of Tennessee. This has led to a highly diversified woodworking industry and made the area around Memphis the center of production for wood flooring. The temperate climate of the state is very favorable for logging operations, allowing full-scale activity during nine months of the year and to a lesser extent during the winter months.

Climate descriptions of Tennessee - Generally, Tennessee has a temperate climate, with warm summers and mild winters. However, the state's varied topography leads to a wide range of climatic conditions.

The warmest parts of the state, with the longest growing season, are the Gulf Coastal Plain, the Central Basin, and the Sequatchie Valley. In the Memphis area in the southwest, the average date of the last killing frost is 20 March, and the growing season is about 235 days. Memphis has an annual mean temperature of 62°F (17°C), 40°F (4°C) in January, and 83°F (28°C) in July. In the Nashville area, the growing season lasts about 225 days. Nashville has an annual mean of 59°F (15°C), ranging from 36°F (2°C) in January to 79°F (26°C) in July. The Knoxville area has a growing season of 220 days. The city's annual mean temperature is 60°F (16°C), with averages of 41°F (5°C) in January and 78°F (26°C) in July. In some parts of the mountainous east, where the temperatures are considerably lower, the growing season is as short as 130 days. The record high temperature for the state is 113°F (45°C), set at Perryville on 9 August 1930; the record low, –32°F (–36°C), was registered at Mountain City on 30 December 1917.

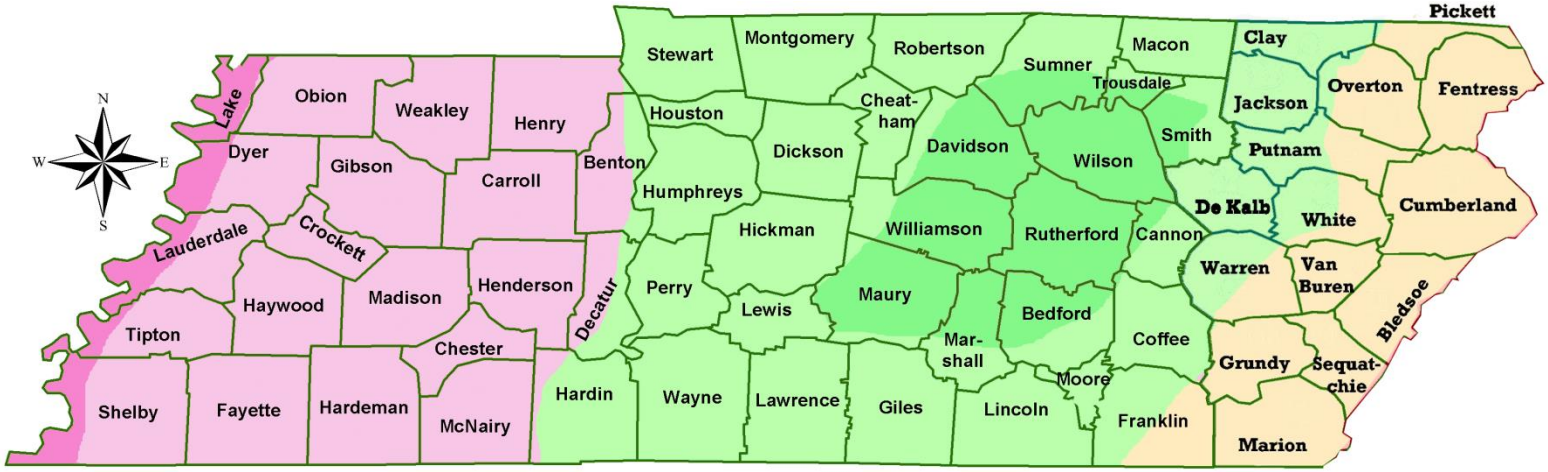
Severe storms occur infrequently. The greatest rainfall occurs in the winter and early spring, especially March; the early fall months, particularly September and October, are the driest. Average annual precipitation (1971–2000) was 54.7 in (138.9 cm) in Memphis and 48 in (122 cm) in Nashville. Snowfall varies and is more prevalent in East Tennessee than in the western section; Nashville gets about 10 in (25.4 cm) a year, Memphis only 5 in (12.7 cm).

Source:

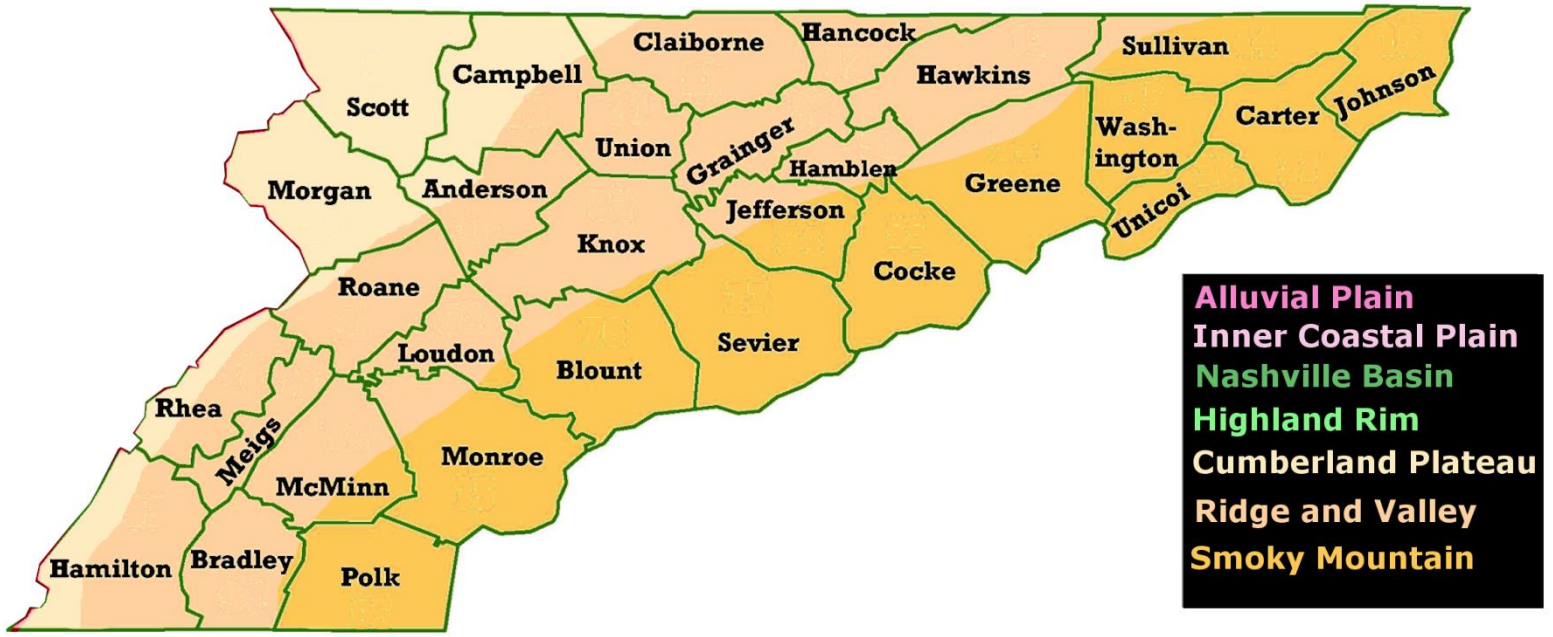
UT Institute of Agriculture > Tennessee Climatological Service > Climate Data for Tennessee

Map of Tennessee Geographic Regions

Central Time Zone Regions (CST UTC-6:00, CDT UTC-5:00)



Eastern Time Zone Regions (CST UTC-5:00, CDT UTC-4:00)



Climate Synopsis for Tennessee

The highly varied topography of Tennessee has a significant impact on the state's climate. The landscape varies generally from west to east, starting with the gently rolling lowlands (200-600' above sea level) in the west, rising to the Highland Rim (600-1000') enclosing the Central Basin, and on up to the Cumberland Plateau (~2000') which trends northeast-southwest across the state in a belt 30-50 miles wide. East of the Plateau is the Great Valley of East Tennessee (elevations ranging from 1500' in the north down to 700' in the south) containing a series of northeast-southwest ridges. The eastern border of the state is dominated by the Great Smoky Mountains, with numerous peaks rising 4000' to 6000' above sea level.

Average annual temperatures across the state range from around 57°F to 60°F (1981-2010). Winter mean temperatures are near 39°F (1981-2010) over most of the state, while summer temperatures average between 74°F and 78°F (1981-2010). Of course, these general patterns are affected by topography: the higher mountain areas tend to have milder summers as well as colder, more blustery winters. The length of the growing season is also linked to topography: most of the state has a growing season between 180 and 220 days, but this stretches to over 235 days in the lowlands around Memphis and drops to near 130 days in the highest mountains to the east.

The principal source of moisture for the state is the Gulf of Mexico to the south, which results in a gradual decrease of precipitation from south to north. This gradient is largely obscured, however, by orographic effects. In West Tennessee, annual precipitation amounts range from 46 inches to 54 inches, increasing from the Mississippi bottomlands to the slight hills farther east. In Middle Tennessee, the variation is from around 45 inches in the Central Basin to 50-55 inches in the surrounding Highland Rim. The Cumberland Plateau also averages 50-55 inches per year. In the Great Valley of Eastern Tennessee, annual precipitation rises from a minimum of 40 inches in the north (the driest part of the state due to the rain shadow effect of the Great Smoky Mountains and the Cumberland Plateau) to over 50 inches in the south. The mountainous eastern border of the state is the wettest part, with annual totals of up to 80 inches in the higher, well-exposed peaks.

Over most of the state, the greatest precipitation occurs in winter and early spring owing to the more frequent passage of large-scale (frontal) storms over the region. A secondary maximum of precipitation occurs in midsummer in response to shower and thunderstorm activity, especially in July in the mountains of the east. Fall tends to be the dry season for the state, due to the higher frequency of slow-moving high pressure areas during this season. Average annual snowfall ranges from 4-6 inches in the south and west to over 10 inches in the east. Due to the relatively mild winter conditions over most of the state, snow cover rarely persists for more than a few days.

Severe storms are relatively infrequent in the state, being east of the center of tornado activity, south of most blizzard conditions, and too far inland to be often affected by hurricanes. Averages of 26 (1991-2011) tornadoes are observed in the state each year, mostly confined to areas west of the Cumberland Plateau. Hailstorms (>1”) at a given location are observed 3 to 6 (2003-2012) times a year, and damaging glaze storms occur in the state every 3 or 4 years (1996-2013). Thunderstorms are frequent in the warm season, and severe thunderstorms with damaging winds are experienced at scattered locations throughout the state each year.

Adapted from: Climatography of the United States, No. 60, National Climatic Data Center

Updated 2/26/2014 by TDAPC using data from NCDC

3-Yr (2015-2017) Wind Rose Data for 10 TN Area ASOS Stations

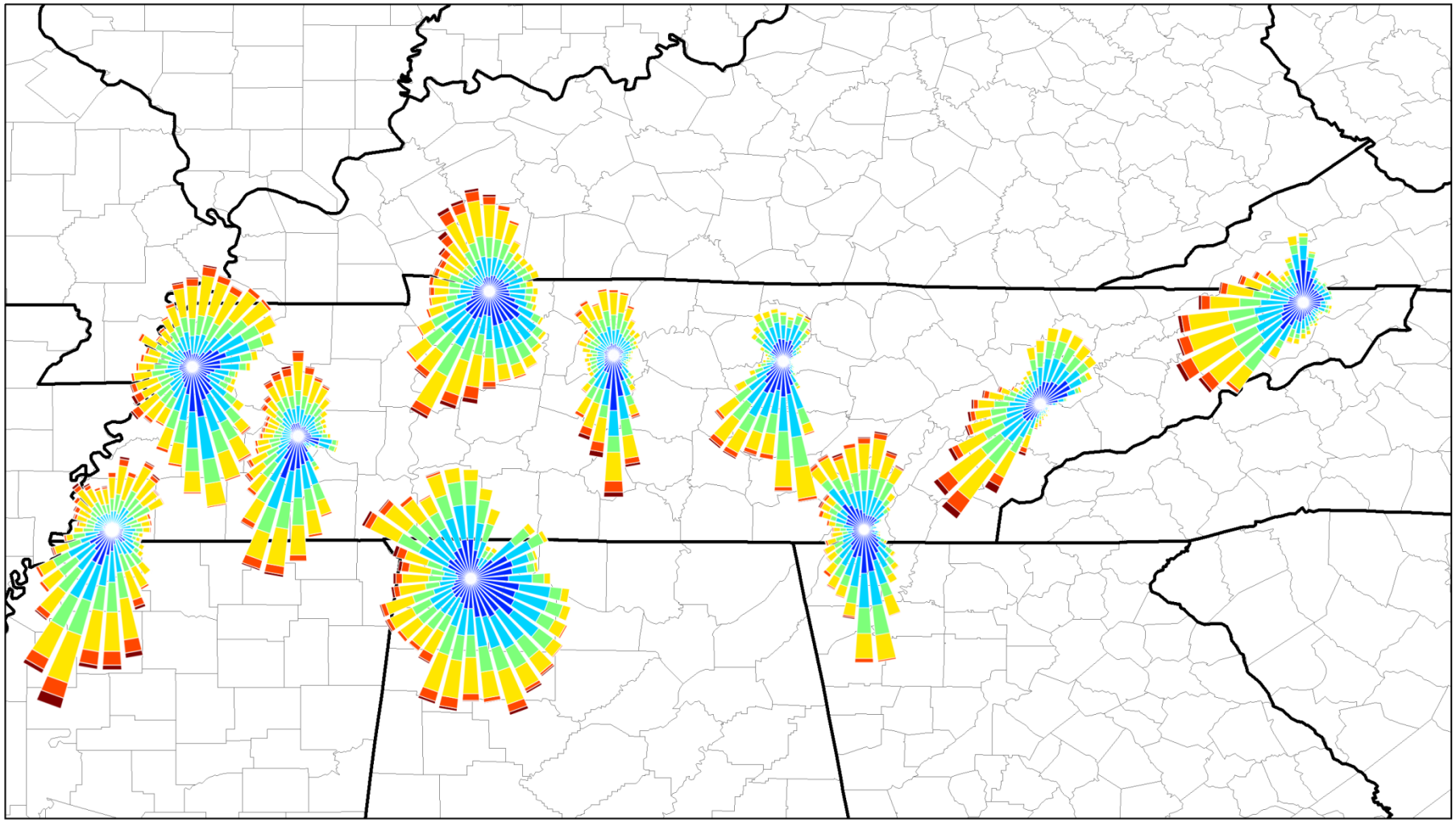


Table 4: Tennessee Metropolitan Statistical Areas and Population Estimates

CBSA	STCOU	NAME	LSAD	CENSUS 2010 POP	POP EST 2017
16860		**Chattanooga, TN-GA**	**Metropolitan Statistical Area**	**528143**	**556548**
16860	13047	Catoosa County, GA	County or equivalent	63942	66550
16860	13083	Dade County, GA	County or equivalent	16633	16285
16860	13295	Walker County, GA	County or equivalent	68756	68939
16860	47065	Hamilton County, TN	County or equivalent	336463	361613
16860	47115	Marion County, TN	County or equivalent	28237	28425
16860	47153	Sequatchie County, TN	County or equivalent	14112	14736
17300		**Clarksville, TN-KY**	**Metropolitan Statistical Area**	**260625**	**285042**
17300	21047	Christian County, KY	County or equivalent	73955	70416
17300	21221	Trigg County, KY	County or equivalent	14339	14444
17300	47125	Montgomery County, TN	County or equivalent	172331	200182
17420		**Cleveland, TN**	**Metropolitan Statistical Area**	**115788**	**122317**
17420	47011	Bradley County, TN	County or equivalent	98963	105560
17420	47139	Polk County, TN	County or equivalent	16825	16757
27180		**Jackson, TN**	**Metropolitan Statistical Area**	**130011**	**129235**
27180	47023	Chester County, TN	County or equivalent	17131	17119
27180	47033	Crockett County, TN	County or equivalent	14586	14473
27180	47113	Madison County, TN	County or equivalent	98294	97643
27740		**Johnson City, TN**	**Metropolitan Statistical Area**	**198716**	**202053**
27740	47019	Carter County, TN	County or equivalent	57424	56488
27740	47171	Unicoi County, TN	County or equivalent	18313	17759
27740	47179	Washington County, TN	County or equivalent	122979	127806
28700		**Kingsport-Bristol-Bristol, TN-VA**	**Metropolitan Statistical Area**	**309544**	**306659**
28700	47073	Hawkins County, TN	County or equivalent	56833	56459
28700	47163	Sullivan County, TN	County or equivalent	156823	157158
28700	51169	Scott County, VA	County or equivalent	23177	21865
28700	51191	Washington County, VA	County or equivalent	54876	54387
28700	51520	Bristol city, VA	County or equivalent	17835	16790
28940		**Knoxville, TN**	**Metropolitan Statistical Area**	**837571**	**877104**
28940	47001	Anderson County, TN	County or equivalent	75129	76257
28940	47009	Blount County, TN	County or equivalent	123010	129929
28940	47013	Campbell County, TN	County or equivalent	40716	39648
28940	47057	Grainger County, TN	County or equivalent	22657	23144
28940	47093	Knox County, TN	County or equivalent	432226	461860
28940	47105	Loudon County, TN	County or equivalent	48556	52152
28940	47129	Morgan County, TN	County or equivalent	21987	21636
28940	47145	Roane County, TN	County or equivalent	54181	53036
28940	47173	Union County, TN	County or equivalent	19109	19442
32820		**Memphis, TN-MS-AR**	**Metropolitan Statistical Area**	**1324829**	**1348260**
32820	5035	Crittenden County, AR	County or equivalent	50902	48750

CBSA	STCOU	NAME	LSAD	CENSUS 2010 POP	POP EST 2017
32820	28009	Benton County, MS	County or equivalent	8729	8312
32820	28033	DeSoto County, MS	County or equivalent	161252	178751
32820	28093	Marshall County, MS	County or equivalent	37144	35619
32820	28137	Tate County, MS	County or equivalent	28886	28441
32820	28143	Tunica County, MS	County or equivalent	10778	10024
32820	47047	Fayette County, TN	County or equivalent	38413	40036
32820	47157	Shelby County, TN	County or equivalent	927644	936961
32820	47167	Tipton County, TN	County or equivalent	61081	61366
34100		**Morristown, TN**	**Metropolitan Statistical Area**	**113951**	**118081**
34100	47063	Hamblen County, TN	County or equivalent	62544	64277
34100	47089	Jefferson County, TN	County or equivalent	51407	53804
34980		**Nashville-Davidson--Murfreesboro--Franklin, TN**	**Metropolitan Statistical Area**	**1670890**	**1903045**
34980	47015	Cannon County, TN	County or equivalent	13801	14216
34980	47021	Cheatham County, TN	County or equivalent	39105	40330
34980	47037	Davidson County, TN	County or equivalent	626681	691243
34980	47043	Dickson County, TN	County or equivalent	49666	52853
34980	47081	Hickman County, TN	County or equivalent	24690	24864
34980	47111	Macon County, TN	County or equivalent	22248	24079
34980	47119	Maury County, TN	County or equivalent	80956	92163
34980	47147	Robertson County, TN	County or equivalent	66283	70177
34980	47149	Rutherford County, TN	County or equivalent	262604	317157
34980	47159	Smith County, TN	County or equivalent	19166	19636
34980	47165	Sumner County, TN	County or equivalent	160645	183545
34980	47169	Trousdale County, TN	County or equivalent	7870	10083
34980	47187	Williamson County, TN	County or equivalent	183182	226257
34980	47189	Wilson County, TN	County or equivalent	113993	136442

Table 5: Tennessee Micropolitan Statistical Areas and Population Estimates

CBSA	STCOU	NAME	LSAD	CENSUS 2010 POP	POP EST 2017
11940		**Athens, TN**	**Micropolitan Statistical Area**	**52266**	**52877**
11940	47107	McMinn County, TN	County or equivalent	52266	52850
18260		**Cookeville, TN**	**Micropolitan Statistical Area**	**106042**	**111363**
18260	47087	Jackson County, TN	County or equivalent	11638	11677
18260	47133	Overton County, TN	County or equivalent	22083	22012
18260	47141	Putnam County, TN	County or equivalent	72321	77674
18900		**Crossville, TN**	**Micropolitan Statistical Area**	**56053**	**59078**
18900	47035	Cumberland County, TN	County or equivalent	56053	59078
19420		**Dayton, TN**	**Micropolitan Statistical Area**	**31809**	**32691**
19420	47143	Rhea County, TN	County or equivalent	31809	32691
20540		**Dyersburg, TN**	**Micropolitan Statistical Area**	**38335**	**37463**
20540	47045	Dyer County, TN	County or equivalent	38335	37463
24620		**Greeneville, TN**	**Micropolitan Statistical Area**	**68831**	**68808**
24620	47059	Greene County, TN	County or equivalent	68831	68808
29980		**Lawrenceburg, TN**	**Micropolitan Statistical Area**	**41869**	**43396**
29980	47099	Lawrence County, TN	County or equivalent	41869	43396
30280		**Lewisburg, TN**	**Micropolitan Statistical Area**	**30617**	**32931**
30280	47117	Marshall County, TN	County or equivalent	30617	32931
32280		**Martin, TN**	**Micropolitan Statistical Area**	**35021**	**33337**
32280	47183	Weakley County, TN	County or equivalent	35021	33337
32660		**McMinnville, TN**	**Micropolitan Statistical Area**	**39839**	**40651**
32660	47177	Warren County, TN	County or equivalent	39839	40651
35460		**Newport, TN**	**Micropolitan Statistical Area**	**35662**	**35556**
35460	47029	Cocke County, TN	County or equivalent	35662	35556
37540		**Paris, TN**	**Micropolitan Statistical Area**	**32330**	**32450**
37540	47079	Henry County, TN	County or equivalent	32330	32450
42940		**Sevierville, TN**	**Micropolitan Statistical Area**	**89889**	**97638**
42940	47155	Sevier County, TN	County or equivalent	89889	97638
43180		**Shelbyville, TN**	**Micropolitan Statistical Area**	**45058**	**48117**
43180	47003	Bedford County, TN	County or equivalent	45058	48117
46100		**Tullahoma-Manchester, TN**	**Micropolitan Statistical Area**	**100210**	**103070**
46100	47031	Coffee County, TN	County or equivalent	52796	55034
46100	47051	Franklin County, TN	County or equivalent	41052	41652
46100	47127	Moore County, TN	County or equivalent	6362	6384
46460		**Union City, TN-KY**	**Micropolitan Statistical Area**	**38620**	**36577**
46460	21075	Fulton County, KY	County or equivalent	6813	6192
46460	47131	Obion County, TN	County or equivalent	31807	30385

https://www.census.gov/data/datasets/2016/demo/popest/total-metro-and-micro-statistical-areas.html

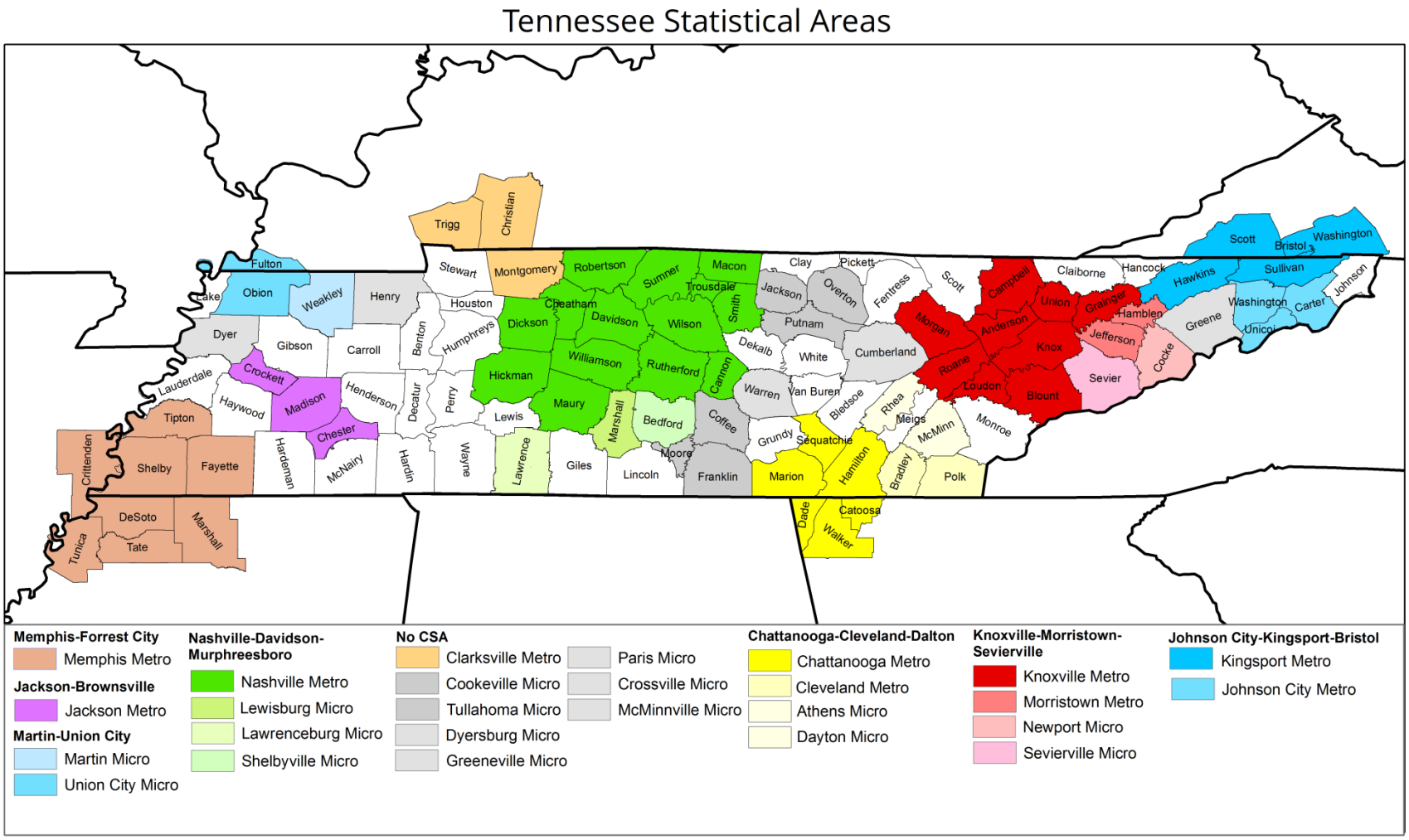
Table 6: Tennessee County Population Data Trends

(2010 Census and Estimates to 2017 by US Census Bureau)

Geography	April 1, 2010		Population Estimate (as of July 1, 2017)							
	Census	Est.	2010	2011	2012	2013	2014	2015	2016	2017
Anderson	75,129	75,094	75,126	75,179	75,326	75,420	75,347	75,698	75,936	76,257
Bedford	45,058	45,056	45,100	45,271	45,307	45,638	46,284	46,940	47,484	48,117
Benton	16,489	16,491	16,493	16,423	16,354	16,280	16,109	16,107	16,014	15,986
Bledsoe	12,876	12,872	12,874	12,847	12,791	13,785	14,535	14,580	14,675	14,717
Blount	123,010	123,100	123,241	123,704	124,069	124,985	126,092	127,142	128,670	129,929
Bradley	98,963	98,932	99,126	99,883	101,101	101,881	102,921	103,907	104,490	105,560
Campbell	40,716	40,723	40,722	40,579	40,460	40,229	39,909	39,728	39,714	39,648
Cannon	13,801	13,816	13,814	13,764	13,868	13,800	13,725	13,854	14,027	14,216
Carroll	28,522	28,480	28,445	28,533	28,707	28,685	28,471	28,131	28,092	27,860
Carter	57,424	57,375	57,313	57,434	57,309	56,982	56,312	56,430	56,502	56,488
Cheatham	39,105	39,103	39,115	38,986	39,245	39,387	39,674	39,690	39,880	40,330
Chester	17,131	17,143	17,184	17,222	17,213	17,340	17,358	17,413	17,453	17,119
Claiborne	32,213	32,212	32,234	32,088	31,770	31,661	31,630	31,687	31,757	31,609
Clay	7,861	7,860	7,843	7,827	7,801	7,784	7,733	7,773	7,752	7,703
Cocke	35,662	35,642	35,644	35,372	35,450	35,287	35,230	35,096	35,219	35,556
Coffee	52,796	52,800	52,783	52,882	53,132	53,324	53,623	54,279	54,682	55,034
Crockett	14,586	14,576	14,574	14,550	14,607	14,590	14,614	14,566	14,411	14,473
Cumberland	56,053	56,062	56,210	56,620	57,073	57,513	57,958	58,278	58,655	59,078
Davidson	626,681	626,580	628,077	635,503	649,004	658,990	668,699	678,323	684,410	691,243
Decatur	11,757	11,750	11,729	11,684	11,660	11,697	11,733	11,657	11,769	11,751
DeKalb	18,723	18,720	18,716	18,794	18,911	19,108	19,211	19,205	19,361	19,852
Dickson	49,666	49,658	49,701	49,946	50,177	50,211	50,609	51,461	52,170	52,853
Dyer	38,335	38,330	38,313	38,148	38,246	38,148	37,868	37,878	37,708	37,463
Fayette	38,413	38,439	38,435	38,569	38,662	38,810	39,072	39,220	39,590	40,036
Fentress	17,959	17,960	17,928	18,026	17,924	17,937	17,867	17,917	18,033	18,136
Franklin	41,052	41,064	40,970	40,862	40,786	41,313	41,428	41,514	41,700	41,652
Gibson	49,683	49,691	49,732	49,873	49,689	49,483	49,541	49,442	49,401	49,111
Giles	29,485	29,489	29,401	29,337	29,006	28,859	28,917	29,079	29,307	29,401
Grainger	22,657	22,656	22,714	22,733	22,649	22,681	22,830	22,835	23,072	23,144
Greene	68,831	68,825	68,826	68,996	68,654	68,272	68,416	68,551	68,615	68,808
Grundy	13,703	13,726	13,738	13,657	13,653	13,509	13,464	13,456	13,389	13,361
Hamblen	62,544	62,533	62,550	62,816	62,712	63,082	63,022	63,414	63,785	64,277
Hamilton	336,463	336,484	337,332	340,939	345,783	348,853	350,545	353,604	357,738	361,613
Hancock	6,819	6,815	6,808	6,711	6,675	6,638	6,602	6,554	6,577	6,600
Hardeman	27,253	27,247	27,154	26,851	26,528	26,251	25,927	25,732	25,435	25,447
Hardin	26,026	26,012	26,039	25,868	26,005	25,981	25,810	25,718	25,679	25,846
Hawkins	56,833	56,829	56,867	56,617	56,561	56,740	56,529	56,443	56,563	56,459
Haywood	18,787	18,807	18,787	18,568	18,281	18,256	18,226	18,028	17,853	17,573
Henderson	27,769	27,782	27,786	28,020	28,006	27,958	27,991	27,984	27,822	27,751
Henry	32,330	32,354	32,404	32,379	32,373	32,253	32,315	32,205	32,310	32,450
Hickman	24,690	24,689	24,648	24,344	24,132	24,153	24,360	24,315	24,295	24,864
Houston	8,426	8,425	8,443	8,338	8,408	8,275	8,220	8,131	8,134	8,213
Humphreys	18,538	18,535	18,569	18,396	18,271	18,230	18,109	18,122	18,347	18,484
Jackson	11,638	11,632	11,596	11,514	11,524	11,533	11,492	11,517	11,566	11,677
Jefferson	51,407	51,660	51,697	52,008	52,428	52,352	52,651	53,288	53,535	53,804
Johnson	18,244	18,244	18,285	18,210	18,121	17,998	17,919	17,821	17,754	17,691

Geography	April 1, 2010		Population Estimate (as of July 1, 2017)							
	Census	Est.	2010	2011	2012	2013	2014	2015	2016	2017
Knox	432,226	432,266	433,056	436,551	440,793	444,325	448,125	451,444	456,132	461,860
Lake	7,832	7,832	7,821	7,778	7,710	7,711	7,662	7,572	7,560	7,468
Lauderdale	27,815	27,822	27,742	27,697	27,676	27,559	27,340	26,959	26,773	25,274
Lawrence	41,869	41,851	41,988	42,059	42,133	41,990	42,297	42,531	43,081	43,396
Lewis	12,161	12,171	12,162	12,152	11,918	11,969	11,878	11,866	11,904	12,035
Lincoln	33,361	33,350	33,411	33,416	33,442	33,574	33,556	33,695	33,645	33,751
Loudon	48,556	48,548	48,738	49,073	49,732	50,374	50,646	50,978	51,454	52,152
McMinn	52,266	52,278	52,197	52,356	52,429	52,405	52,710	52,636	52,850	52,877
McNairy	26,075	26,077	26,056	26,050	26,160	26,078	26,114	25,997	25,935	26,004
Macon	22,248	22,227	22,245	22,462	22,501	22,619	22,942	23,108	23,450	24,079
Madison	98,294	98,299	98,258	98,022	98,523	98,715	98,130	97,609	97,663	97,643
Marion	28,237	28,222	28,224	28,075	28,218	28,316	28,373	28,462	28,446	28,425
Marshall	30,617	30,606	30,678	30,885	30,928	31,082	31,233	31,518	31,915	32,931
Maury	80,956	80,930	81,188	81,415	81,969	83,611	85,541	87,735	89,981	92,163
Meigs	11,753	11,768	11,795	11,684	11,701	11,696	11,744	11,872	12,005	12,068
Monroe	44,519	44,505	44,618	44,930	45,150	45,223	45,390	45,677	45,970	46,240
Montgomery	172,331	172,362	173,218	176,655	185,225	184,637	189,655	193,294	195,734	200,182
Moore	6,362	6,345	6,340	6,401	6,336	6,302	6,317	6,290	6,323	6,384
Morgan	21,987	21,986	21,999	22,058	21,947	21,707	21,742	21,492	21,554	21,636
Obion	31,807	31,807	31,815	31,683	31,346	31,068	30,875	30,633	30,578	30,385
Overton	22,083	22,084	22,096	22,193	22,222	22,021	22,002	22,156	22,051	22,012
Perry	7,915	7,928	7,944	7,863	7,854	7,878	7,845	7,914	7,964	7,975
Pickett	5,077	5,077	5,072	5,132	5,070	5,044	5,081	5,142	5,142	5,073
Polk	16,825	16,826	16,810	16,737	16,606	16,640	16,722	16,744	16,772	16,757
Putnam	72,321	72,347	72,580	72,981	73,487	73,992	74,878	74,974	75,931	77,674
Rhea	31,809	31,802	31,859	32,051	32,338	32,526	32,607	32,392	32,442	32,691
Roane	54,181	54,193	54,159	53,856	53,506	53,035	52,773	52,726	52,874	53,036
Robertson	66,283	66,349	66,391	66,693	66,743	67,244	67,923	68,452	69,165	70,177
Rutherford	262,604	262,592	263,776	269,136	274,386	281,289	289,095	298,423	308,251	317,157
Scott	22,228	22,232	22,240	22,121	22,175	22,024	22,026	21,974	21,947	21,989
Sequatchie	14,112	14,121	14,137	14,280	14,426	14,663	14,773	14,789	14,897	14,736
Sevier	89,889	89,725	89,977	91,123	92,299	93,356	94,696	95,661	96,673	97,638
Shelby	927,644	927,684	928,652	933,011	938,965	938,091	937,162	936,131	934,603	936,961
Smith	19,166	19,149	19,124	19,145	19,114	19,050	19,014	19,253	19,447	19,636
Stewart	13,324	13,313	13,337	13,228	13,311	13,308	13,243	13,240	13,182	13,355
Sullivan	156,823	156,806	156,820	156,929	156,547	156,562	156,784	156,661	156,667	157,158
Sumner	160,645	160,617	161,249	163,882	166,101	169,110	172,790	175,866	180,063	183,545
Tipton	61,081	61,006	61,077	61,282	61,609	61,599	61,672	61,605	61,303	61,366
Trousdale	7,870	7,864	7,862	7,800	7,774	7,782	7,990	8,035	8,271	10,083
Unicoi	18,313	18,315	18,277	18,285	18,227	18,047	17,914	17,820	17,719	17,759
Union	19,109	19,109	19,102	19,213	19,120	19,055	18,964	19,126	19,140	19,442
Van Buren	5,548	5,558	5,557	5,540	5,635	5,570	5,625	5,686	5,689	5,742
Warren	39,839	39,824	39,851	39,869	39,745	39,893	40,003	40,338	40,516	40,651
Washington	122,979	123,065	123,423	123,920	124,907	125,516	125,999	126,357	127,440	127,806
Wayne	17,021	17,027	16,985	17,012	16,996	16,918	16,846	16,738	16,713	16,583
Weakley	35,021	35,015	35,027	34,907	34,594	34,186	34,001	33,831	33,507	33,337
White	25,841	25,836	25,838	26,050	26,096	26,273	26,346	26,495	26,653	26,753
Williamson	183,182	183,252	184,143	188,342	193,095	199,032	205,317	211,674	219,107	226,257
Wilson	113,993	114,057	114,671	116,780	119,109	122,014	125,404	128,772	132,781	136,442

2010 Combined/Metropolitan/Micropolitan Statistical Areas of Tennessee



Appendix A: DAPC Monitoring Equipment Evaluation 2018

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
Nashville Field Office	Multi-gas calibrator	Portable Calibrator T750U	Good
Nashville Field Office	Multi-gas calibrator	Portable Calibrator T750U	Good
Bristol	HiVol variable orifice	Kit #9	Good
Athens	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good
Athens	TEOM shelter	Ekto	Good
Blountville	Data logger	Agilaire 8872	Good
Blountville	Data logger	ESC 8832	Good
Blountville	Data logger	ESC 8832	Good
Blountville	Ozone analyzers	API 400A	Good
Blountville	Trailer	T&R 8X20	Poor
Loudon Elementary School	Ozone Calibrator	703E Ozone Calibrator	Good
Blountville	Teledyne 400A	Teledyne 400A	Good
Chattanooga	Flow Check Device	Streamline Pro	Good
Bristol	HiVol TSP/Lead	Tisch Housing	Good
Bristol	HiVol TSP/Lead	Tisch Housing	Good
Columbia	Flow Check Device	Streamline Pro	Good
Cedars of Lebanon	Data logger	Agilaire 8872	Good
Cedars of Lebanon	Data logger	ESC 8832	Good
Cedars of Lebanon	Data logger	ESC 8832	Good
Cedars of Lebanon	TEI49C	TEI49C	Good
Cedars of Lebanon	Ozone Calibrator	703E Ozone Calibrator	Good
Cookeville	Flow Check Device	Streamline Pro	Good
Cedars of Lebanon	Ozone analyzers	T400	Good
NFO Storage	Ozone Calibrator	703E Ozone Calibrator	Good
Centerhill	Trailer	Ozone shelter 820	Poor
Central Office	Data logger	Agilaire 8872	Good
Central Office	Data logger	Agilaire 8872	Good
JCFO	Flow Check Device	Streamline Pro	Good
Clarksville	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good
Clarksville	TEOM shelter	Ekto	Good
Columbia	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good
JFO	Flow Check Device	Streamline Pro	Good
Cookeville	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good
KFO	Flow Check Device	Streamline Pro	Good
Dyersburg	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
Dyersburg	TEOM shelter	Ekto	Good
Fairview	Data logger	Agilaire 8872	Good
Fairview	Data logger	ESC 8832	Good
Fairview	Data logger	ESC 8832	Good
Blountville	Ozone Calibrator	703E Ozone Calibrator	Good
Fairview	TEI49C	TEI49C	Good
Freel's Bend	Data logger	Agilaire 8872	Good
Freel's Bend	Data logger	ESC 8832	Good
Freel's Bend	Data logger	ESC 8832	Good
Loudon Elementary School	Ozone analyzers	T400	Good
Fairview	Ozone Calibrator	T703 Ozone Calibrator	Good
Nashville Field Office	Air Compressor (1 of 2)	0.5 HP	Good
Freel's Bend	SO2 analyzers	Teledyne M100E	Good
Freel's Bend	SO2 Calibrator	T700 SO2 Calibrator	Good
Harriman	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good
Nashville Field Office	Air Compressor (2 of 2)	0.5 HP	Good
Harriman	TEOM shelter	Ekto	Good
Hendersonville	Data logger	Agilaire 8872	Good
Hendersonville	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good
Hendersonville	Data logger	ESC 8832	Good
Hendersonville	Data logger	ESC 8832	Good
Hendersonville	PM 2.5 filter sampler	R&P 2025, FRM	Good
Hendersonville	TEI49C	TEI49C	Good
Freel's Bend	Ozone Calibrator	T703 Ozone Calibrator	Good
Plan to purchase*	Zero air supply	Purchase additional T701 Zero Air Supplies	Good
Jackson	PM 2.5 filter sampler	R&P 2025, FRM	Good
Jackson	PM 2.5 filter sampler	R&P 2025, FRM	Good
Jackson	TEOM shelter	Ekto	Good
Blountville	Trailer	Ozone shelter 820	Poor
JCFO	Trailer	Ozone shelter 820	Poor
Cedars of Lebanon	Trailer	Ozone shelter 820	Poor
Freel's Bend	Trailer	Ozone shelter 820	Poor
Kingsport	Data logger	Agilaire 8872	Good
Kingsport	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good
Kingsport	Data logger	ESC 8832	Good
Kingsport	Data logger	ESC 8832	Good

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
Kingsport	Data logger	ESC 8832	Good
Kingsport	Ozone Calibrator	T703 Ozone Calibrator	Good
Kingsport	Teledyne T400	Teledyne T400	Good
Kingsport	TEOM shelter	Ekto	Good
Harriman	TEOM shelter	Ekto	Poor
Lawrence	TEOM shelter	Ekto	Good
Loretto County Site	BAM 1020 Enclosure	432SP	Good
Loudon Elementary School	Data logger	Agilaire 8872	Good
Loudon Elementary School	Data logger	ESC 8832	Good
Loudon Elementary School	Data logger	ESC 8832	Good
New Market	Ozone Calibrator	T703 Ozone Calibrator	Good
Blountville	Ozone Calibrator	T703 Ozone Calibrator	Good
NFO Storage and QA	Ozone analyzers	T400	Good
Hendersonville	Trailer	Ozone shelter 820	Poor
Maryville	TEOM shelter	Ekto	Good
Kingsport	Trailer	Ozone shelter 820	Poor
Loudon Elementary School	Trailer	O D I, Model 818	Poor
Nashville Field Office	Equinox, SUV	Quality Assurance Audit Vehicle	Good
Nashville Field Office	HiVol calibration	Orifice, variable; plan to be replaced	Good
New Market	Data logger	Agilaire 8872	Good
NFO Storage	Ozone Calibrator	T703 Ozone Calibrator	Good
New Market	Trailer	Ozone shelter 820	Poor
New Market	Data logger	ESC 8832	Good
New Market	Ozone analyzers	API 400E	Good
NFO	Flow Check Device	Streamline Pro	Good
NFO -Quality Assurance	Flow Check Device	Streamline Pro	Good
NFO -Quality Assurance	Flow Check Device	Streamline Pro	Good
NFO -Quality Assurance	Flow Check Device	Streamline Pro	Good
NFO -Quality control	Flow Check Device	Streamline Pro	Good
NFO Storage	Flow Check Device	Streamline Pro	Good
NFO Storage	Flow Check Device	Streamline Pro	Good
NFO Storage	Flow Check Device	Streamline Pro	Good
NFO Storage and QA	Data logger	Agilaire 8872	Good
NFO Storage and QA	Data logger	Agilaire 8872	Good
NFO Storage and QA	Data logger	Agilaire 8872	Good
NFO Storage and QA	Aircheck 224-PCXR7	Aircheck 224-PCXR7	Poor

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
NFO Storage and QA	Aircheck 224-PCXR7	Aircheck 224-PCXR7	Poor
NFO Storage and QA	Aircheck 224-PCXR7	Aircheck 224-PCXR7	Poor
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FEM PM 2.5	Good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FEM PM 2.5	Good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FEM PM 2.5	Good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FEM PM 2.5	Good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FEM PM 2.5	Good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FEM PM 2.5	Good
NFO Storage and QA	PM 2.5 Continuous	BAM 1020, FEM PM 2.5	Good
NFO Storage and QA	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good
NFO Storage and QA	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good
NFO Storage and QA	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good
NFO Storage and QA	PM 2.5 Continuous	BAM 1022, FEM PM 2.5	Good
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator, replace with newer versions	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator, replace with newer versions	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator, replace with newer versions	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator, replace with newer versions	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator, replace with newer versions	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Dasisbi 1008PC	Ozone calibrator	Poor
NFO Storage and QA	Data logger	ESC 8816	Good
NFO Storage and QA	Data logger	ESC 8816	Good
NFO Storage and QA	Data logger	ESC 8816	Good
NFO Storage and QA	Data logger	ESC 8816	Good
NFO Storage and QA	Data logger	ESC 8816	Poor
NFO Storage and QA	Data logger	ESC 8816	Good

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
NFO Storage and QA	Data logger	ESC 8816	Good
NFO Storage and QA	Data logger	ESC 8816	Poor
NFO Storage and QA	Data logger	ESC 8816	Poor
NFO Storage and QA	Data logger	ESC 8816	Poor
NFO Storage and QA	Data logger	ESC 8816	Good
NFO Storage and QA	Data logger	ESC 8816	Good
NFO Storage and QA	Data logger	ESC 8816	Poor
NFO Storage and QA	Data logger	ESC 8816	Poor
NFO Storage and QA	Data logger	ESC 8832	Good
NFO Storage and QA	Data logger	ESC 8832	Good
NFO Storage and QA	Data logger	ESC 8832	Good
NFO Storage and QA	Data logger	ESC 8832	Good
NFO Storage and QA	Data logger	ESC 8832	Good
NFO Storage and QA	Flow bench standard, multi gas standard QA	Mesa Labs Drycal	Good
NFO Storage and QA	Flow bench standard, multi gas standard QA	Seirra Cal Bench	Poor
NFO Storage and QA	Flow Check Device	BGI Challenger	Good
NFO Storage and QA	Flow Check Device	BGI TetraCal	Good
NFO Storage and QA	HiVol TSP/Lead	GMW 2000	Good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	Good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	Good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	Good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	Good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	Good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	Good
NFO Storage and QA	HiVol TSP/Lead	GMW 76-100	Good
NFO Storage and QA	HiVol TSP/Lead	GMW Housing	Good
NFO Storage and QA	HiVol TSP/Lead	GMW Housing	Good
NFO Storage and QA	HiVol TSP/Lead	GMW Housing	Good
NFO Storage and QA	HiVol TSP/Lead	GMW Housing	Good
NFO Storage and QA	HiVol TSP/Lead	Anderson 2000	Good
NFO Storage and QA	HiVol TSP/Lead	Tisch Housing	Good
NFO Storage and QA	HiVol TSP/Lead	Tisch Housing	Good
NFO Storage and QA	HiVol TSP/Lead	Tisch Housing	Good
NFO Storage and QA	Multi-gas calibrator	Environics 6100	Good
NFO Storage and QA	Multi-gas calibrator	Environics Calibrator 6103	Good
NFO Storage and QA	Multi-gas calibrator	Environics Calibrator 6103	Poor

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
NFO Storage and QA	Multi-gas calibrator	Environics Calibrator 6103	Poor
NFO Storage and QA	Ozone analyzers	API 400A	Poor
NFO Storage and QA	Ozone analyzers	API 400A	Poor
NFO Storage and QA	Ozone analyzers	API 400A	Good
NFO Storage and QA	Ozone analyzers	API 400A	Poor
NFO Storage and QA	Ozone analyzers	API 400E	Good
NFO Storage and QA	Ozone analyzers	API 400E	Good
NFO Storage and QA	Ozone analyzers	API 400E	Poor
NFO Storage and QA	Ozone analyzers	API 400E	Poor
NFO Storage and QA	Ozone analyzers	T400	Good
Blountville	Ozone analyzers	T400	Good
Freel's Bend	Ozone analyzers	T400	Good
NFO Storage and QA	Ozone analyzers	TEI 49C, plan to replace with T400	Good
NFO Storage and QA	Ozone analyzers	TEI 49C, plan to replace with T400	Good
Hendersonville	Ozone Calibrator	T703 Ozone Calibrator	Good
NFO Storage and QA	Ozone analyzers	TEI 49i (ref photometer)	Good
NFO Storage and QA	Ozone analyzers	TEI 49i (ref photometer)	Good
NFO Storage and QA	PM 2.5 Speciation	MetOne SASS	Good
NFO Storage and QA	PM 2.5 Speciation	MetOne SASS	Good
NFO Storage and QA	PM 2.5 Speciation	MetOne SASS	Good
NFO Storage and QA	PM 2.5 Speciation	MetOne SASS	Poor
NFO Storage and QA	PM 2.5 Speciation	MetOne SASS	Good
NFO Storage and QA	PM10 inlet	Graseby	Good
NFO Storage and QA	PM10 inlet	Graseby	Good
NFO Storage and QA	PM 2.5 filter sampler	R&P 2025, FRM	Good
NFO Storage and QA	Orifice certification HiVol	Roots meter	Good
NFO Storage and QA	Orifice certification HiVol	Roots meter 5M125TC	Good
NFO Storage and QA	Flow Check Device	BGI TetraCal	Good
NFO Storage and QA	T100 SO2 Analyzer	gas monitor	Good
NFO Storage and QA	T100 SO2 Analyzer	gas monitor	Good
NFO Storage and QA	SO2 Calibrator	T700 SO2 Calibrator	Good
NFO Storage and QA	SO2 Calibrator	T700 SO2 Calibrator	Good
Ross N Robinson	Portable zero air	T701 Zero Air Supply	Good
Ross N Robinson	Data logger	Agilaire 8872	Good
NFO Storage and QA	Multi-gas calibrator	TEI 146	Poor
NFO Storage and QA	TEI49C	TEI49C	Good

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
NFO Storage and QA	TEI49C	TEI49C	Good
NFO Storage and QA	Ozone analyzers	TEI 49i	Good
NFO Storage and QA	Ozone analyzers	Teledyne API 400E	Good
NFO Storage and QA	Ozone analyzers	Teledyne API 400E	Good
NFO Storage and QA	Ozone analyzers	Teledyne API 400E	Good
NFO Storage and QA	Ozone analyzers	Teledyne API T400	Good
NFO Storage and QA	Ozone analyzers	Teledyne API T400	Good
NFO Storage and QA	Ozone analyzers	Teledyne API T400	Good
NFO Storage and QA	Ozone analyzers	Teledyne API T400	Good
NFO Storage and QA	SO2 analyzers	Teledyne M100E	Good
NFO Storage and QA	SO2 analyzers	Teledyne M100E	Good
NFO Storage and QA	SO2 analyzers	Teledyne T100	Good
NFO Storage and QA	SO2 Calibrator	T700 SO2 Calibrator	Good
NFO Storage and QA	Multi-gas calibrator	Teledyne T750U, plan to order two additional units	Good
NFO Storage and QA	Multi-gas calibrator	Teledyne T750U	Good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	Good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	Good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	Good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	Good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	Good
NFO Storage and QA	PM 2.5/10 filter sampler	TEOM 1400a, PM 10 FEM	Poor
NFO Storage and QA	TEOM shelter	Ekto	Good
NFO Storage and QA	Flow Check Device	Tetracal, for TEOM	Good
NFO Storage and QA	Flow Check Device	Tetracal, for TEOM	Good
NFO Storage and QA	Trailer	Ozone shelter 820	Poor
NFO Storage and QA	Trailer	Ozone shelter 820	Poor
NFO Storage and QA	Carbon speciation PM 2.5	URG3000N	Good
NFO Storage and QA	Carbon speciation PM 2.5	URG3000N	Good
NFO Storage and QA	Weather	Climatronics Sonic	Good
NFO Storage and QA	SO2 analyzers	Teledyne M100E	Good
Pope	Trailer	Ozone shelter 820	Poor
Ross N Robinson	Data logger	ESC 8832	Good
Ross N Robinson	SO2 analyzers	Teledyne T100	Good
Ross N Robinson	SO2 Calibrator	T700 SO2 Calibrator	Good
Skyland Drive	34 foot tower	Met Tower Sample Manifold	Good

PHYSICAL LOCATION	EQUIPMENT DETAILS		CONDITION
Skyland Drive	Portable zero air	T700 SO2 Calibrator	Good
Skyland Drive	Data logger	Agilaire 8872	Good
Skyland Drive	Data logger	ESC 8832	Good
Skyland Drive	SO2 Calibrator	T700 SO2 Calibrator	Good

Appendix B: Tennessee Monitoring Site Agreement Letters

Kentucky

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

Division of Air Pollution Control
William R. Snodgrass TN Tower
312 Rosa L. Parks Ave., 15th Floor
Nashville, Tennessee 37243

July 2, 2014

Sean Alteri, Director
Kentucky Division for Air Quality
Kentucky Department for Environmental Protection
200 Fair Oaks Lane
Frankfort, KY 40601

Dear Mr. Alteri:

The United States Environmental Protection Agency (EPA) revised monitoring regulations found in 40 CFR Part 58, Appendix D states in part: "The EPA recognizes that there may be situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or to divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator." This revision of the CFR also describes the minimum monitoring requirements for the NAAQS pollutants, including continuous PM 2.5 as it applies to MSA areas where the population is sufficient to warrant monitoring for that pollutant. Tennessee and Kentucky share the Clarksville, TN-KY MSA, which is comprised of Trigg and Christian counties in Kentucky and Montgomery county in Tennessee. The US Census Bureau lists this area as containing a population in excess of 260,000.

CBSA Code	Geographic area	Legal/statistical Area description	July 1, 2013 Estimate	2010 Census
17300	Clarksville, TN-KY	Metropolitan Statistical Area	272,579	260,625

The Tennessee Division of Air Pollution Control (TDAPC) currently operates one (1) PM 2.5 FRM monitor and one (1) continuous PM 2.5 monitor in this area. The TDAPC believes the operation of the existing PM 2.5 monitors; (FRM and continuous), are sufficient to properly characterize the particulate air quality in the entire Clarksville, TN-KY MSA and comply with the requirements for both population and concentration based monitoring identified in the revised monitoring regulations as found at 40 CFR58,AppD. The TDAPC would like to invite the

Kentucky Division for Air Quality to participate in Tennessee's annual ambient air monitoring network review. Tennessee commits to sharing with Kentucky any and all quality assured ambient air monitoring data collected in the Tennessee portion of the Clarksville, TN-KY MSA. Tennessee also will notify Kentucky in advance of the intent to relocate or shutdown any of the PM 2.5 monitors referenced above so that adequate monitoring arrangements can be made to meet the entire MSA monitoring requirements for PM 2.5.

Sincerely,

Barry R. Stephens, PE
Director, Air Pollution Control Division

BRS/lb
Cc: Heather McTeer-Toney, US EPA Region IV

Steven L. Beshear
Governor

Leonard K. Peters
Secretary

Energy and Environment Cabinet
Department for Environmental Protection
Division for Air Quality
200 Fair Oaks Lane, 1st Floor
Frankfort, Kentucky 40601-1403
Web site: air.ky.gov

May 15, 2015

Mr. Barry R. Stephens, PE
Director
Tennessee Division of Air Pollution Control
312 Rosa L. Parks Avenue, 15th Floor
Nashville, TN 37243

Dear Mr. Stephens:

In a letter from your office dated July 1, 2014, the Tennessee Division of Air Pollution Control (TDAPC) agreed to operate a continuous $PM_{2.5}$ monitor and an intermittent FRM $PM_{2.5}$ sampler, to meet the minimum network design requirements stated in 40 CFR 58, Appendix D for the Clarksville, TN-KY metropolitan statistical area (MSA). The Kentucky Division for Air Quality (Division) appreciates TDAPC's cooperation and looks forward to participating in TDAPC's annual air monitoring network review.

The Division currently operates one (1) intermittent FRM $PM_{2.5}$ sampler and one (1) continuous ozone monitor at the Hopkinsville site (21-047-0006) in Christian County. In accordance with Table D-2 of 40 CFR 58, Appendix D, one (1) ozone monitor is required to be operated in the Clarksville, TN-KY MSA, based upon the most current population estimates from the US Census Bureau, as well as 2012-2014 ozone design values.

Geographic Area	Area Description	2014 USCB Population Estimate	2014 Three-Year Ozone DV (ppm)
Christian County, KY	County	74,250	0.067
Trigg County, KY	County	14,142	0.069 (CASTNET)
Montgomery County, TN	County	189,961	N/A
Clarksville, TN-KY	**MSA**	**278,353**	**0.069**

To satisfy the regulatory requirement, the Division agrees to operate one ozone monitor at the Hopkinsville site. Also, the Division agrees to notify TDAPC in the event that shutdown or relocation of the ozone monitor is necessary.

Despite the fact that 2012-2014 design values show that no FRM $PM_{2.5}$ samplers are required in the Clarksville MSA, the Division will continue to operate the $PM_{2.5}$ sampler at

Hopkinsville. The Division also agrees to notify TDAPC in the event that the Hopkinsville FRM $PM_{2.5}$ sampler must be shutdown or relocated, as it is the design value monitor for the MSA.

The Division commits to sharing with TDAPC any and all quality-assured ambient monitoring data collected in the Kentucky portion of the Clarksville, TN-KY MSA. The Division also welcomes TDAPC participation in Kentucky's annual network review process. If you have any questions or concerns, please contact me at 502-564-3999.

Sincerely,

Sean Alteri,
Director

SA/jfm
c: -Heather McTeer Toney, USEPA Region IV
-Daniel Garver, USEPA Region IV

Virginia

Department of Environment & Conservation

May 13, 2016

Michael Dowd
Director of Air Division
Virginia Department of Environmental Quality
P.O. Box 1105
Richmond, VA 23218

Dear Mr. Dowd,

This letter is in regard to ambient air monitoring in the MSA/CSA that our two states share.

The United States Environmental Protection Agency's (EPA) revised monitoring regulations found in 40 CFR Part 58, Appendix D state in part: "The EPA recognizes that there may situations where the EPA Regional Administrator and the affected State or local agencies may need to augment or divide the overall MSA/CSA monitoring responsibilities and requirements among these various agencies to achieve an effective network design. Full monitoring requirements apply separately to each affected State or local agency in the absence of an agreement between the affected agencies and the EPA Regional Administrator." This revision of the CFR also describes the minimum monitoring requirements for the NAAQS pollutants.

Tennessee and Virginia share the Kingsport-Bristol-Bristol, TN-VA MSA, which is comprised of Scott and Washington counties in Virginia, and Hawkins and Sullivan counties in Tennessee. The US Census Bureau estimates the 2015 population under 309,000; however in 2010 the census population was 309,544.

CBSA Code	Geographic Area	Legal/Statistical Area Description	2015 Estimate	2010 Census
28700	Kingsport-Bristol-Bristol, TN-VA MSA	Metropolitan Statistical Area	307,120	309,544

The Tennessee Division of Air Pollution Control (DAPC) currently operates a $PM_{2.5}$, TEOM continuous monitor at site 47-163-1007, two ozone monitors at sites 47-163-2002 and 47-163-2003, and a lead monitor at site 47-163-3004, all in Sullivan County. In addition, we are establishing two SO_2 monitoring sites in the Kingsport, Sullivan County nonattainment area.

Upon a 3 year data review, the records show the ozone concentrations recorded by the two ozone monitors are similar. DAPC will propose that the ozone monitor site 47-163-2002 be shut down in 2017 or at the conclusion of the 2016 ozone monitoring season. The other sites with

Division of Air Pollution Control
William R. Snodgrass Tennessee Tower 15th Floor
312 Rosa L. Parks Avenue Nashville, TN 37243
Tel: 615-532-0554 Fax: 615-532-0614
Air.Pollution.Control@tn.gov
We value your opinion. Please take a few minutes to complete our customer service survey.

existing monitors in operation: (ozone, $PM_{2.5}$ FRM, and $PM_{2.5}$ continuous TEOM), are sufficient to properly characterize the air quality in the entire Kingsport-Bristol-Bristol, TN-VA MSA and comply with the requirements for both population and concentration-based monitoring, identified in the revised monitoring regulations found in 40 CFR Part 58, Appendix D. The TEOM monitor is used for air quality forecasting.

TDAPC would like to invite the Virginia Department of Environmental Quality Air Division to participate in Tennessee's annual ambient air monitoring network review. Tennessee commits to notifying the Virginia Department of Environmental Quality Air Division in advance of any proposed relocation or shut down of ozone or $PM_{2.5}$ monitors referenced above so that adequate monitoring arrangements can be made to meet the entire MSA monitoring requirements.

If you have technical questions contact Jason Stephens at 615-532-0584/ jason.stephens@tn.gov. I may be contacted at 615-532-9668/michelle.b.walker@tn.gov.

Sincerely,

Michelle W. Owenby

Michelle Walker Owenby
Director
Department of Environment and Conservation
Division of Air Pollution Control

Cc: Heather McTeer-Toney, US EPA Region IV

Appendix C: Sections of the CFR Referred to in the 2018/19 ANMP

§ 58.10 Annual monitoring network plan and periodic network assessment.

(a)(1) Beginning July 1, 2007, the state, or where applicable local, agency shall submit to the Regional Administrator an annual monitoring network plan which shall provide for the documentation of the establishment and maintenance of an air quality surveillance system that consists of a network of SLAMS monitoring stations that can include FRM, FEM, and [Approved Regional Method] monitors that are part of SLAMS, NCore, [Chemical Speciation Networks], PAMS, and SPM stations. The plan shall include a statement of whether the operation of each monitor meets the requirements of appendices A, B, C, D, and E of this part, where applicable. The Regional Administrator may require additional information in support of this statement. The annual monitoring network plan must be made available for public inspection and comment for at least 30 days prior to submission to the EPA and the submitted plan shall include and address, as appropriate, any received comments.

(2) Any annual monitoring network plan that proposes network modifications (including new or discontinued monitoring sites, new determinations that data are not of sufficient quality to be compared to the NAAQS, and changes in identification of monitors as suitable or not suitable for comparison against the annual $PM_{2.5}$ NAAQS) to SLAMS networks is subject to the approval of the EPA Regional Administrator, who shall approve or disapprove the plan within 120 days of submission of a complete plan to the EPA.

(3) The plan for establishing required NCore multipollutant stations shall be submitted to the Administrator not later than July 1, 2009. The plan shall provide for all required stations to be operational by January 1, 2011.

(4) A plan for establishing source-oriented Pb monitoring sites in accordance with the requirements of appendix D to this part for Pb sources emitting 1.0 tpy or greater shall be submitted to the EPA Regional Administrator no later than July 1, 2009, as part of the annual network plan required in paragraph (a)(1) of this section. The plan shall provide for the required source-oriented Pb monitoring sites for Pb sources emitting 1.0 tpy or greater to be operational by January 1, 2010. A plan for establishing source-oriented Pb monitoring sites in accordance with the requirements of appendix D to this part for Pb sources emitting equal to or greater than 0.50 tpy but less than 1.0 tpy shall be submitted to the EPA Regional Administrator no later than July 1, 2011. The plan shall provide for the required source-oriented Pb monitoring sites for Pb sources emitting equal to or greater than 0.50 tpy but less than 1.0 tpy to be operational by December 27, 2011.

(5)(i) A plan for establishing or identifying an area-wide NO_2 monitor, in accordance with the requirements of Appendix D, section 4.3.3 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2012. The plan shall provide for these required monitors to be operational by January 1, 2013.

(ii) A plan for establishing or identifying any NO_2 monitor intended to characterize vulnerable and susceptible populations, as required in Appendix D, section 4.3.4 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2012. The plan shall provide for these required monitors to be operational by January 1, 2013.

(iii) A plan for establishing a single near-road NO_2 monitor in CBSAs having 1,000,000 or more persons, in accordance with the requirements of Appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2013. The plan shall provide for these required monitors to be operational by January 1, 2014.

(iv) A plan for establishing a second near-road NO2 monitor in any CBSA with a population of 2,500,000 persons or more, or a second monitor in any CBSA with a population of 1,000,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts, in accordance with the requirements of appendix D, section 4.3.2 to this part, shall be submitted as part of the Annual Monitoring Network Plan to the EPA Regional Administrator by July 1, 2014. The plan shall provide for these required monitors to be operational by January 1, 2015.

(6) A plan for establishing SO_2 monitoring sites in accordance with the requirements of Appendix D to this part shall be submitted to the EPA Regional Administrator by July 1, 2011 as part of the annual network plan required in paragraph (a) (1). The plan shall provide for all required SO_2 monitoring sites to be operational by January 1, 2013.

(7) A plan for establishing CO monitoring sites in accordance with the requirements of Appendix D to this part shall be submitted to the EPA Regional Administrator. Plans for required CO monitors shall be submitted at least six months prior to the date such monitors must be established as required by section 58.13.

(8)(i) A plan for establishing near-road $PM_{2.5}$ monitoring sites in CBSAs having 2.5 million or more persons, in accordance with the requirements of Appendix D to this part, shall be submitted as part of the annual monitoring network plan to the EPA Regional Administrator by July 1, 2014. The plan shall provide for these required monitoring stations to be operational by January 1, 2015.

(ii) A plan for establishing near-road $PM_{2.5}$ monitoring sites in CBSAs having 1 million or more persons, but less than 2.5 million persons, in accordance with the requirements of Appendix D to this part, shall be submitted as part of the annual monitoring network plan to the EPA Regional Administrator by July 1, 2016. The plan shall provide for these required monitoring stations to be operational by January 1, 2017.

(9) The annual monitoring network plan shall provide for the required O_3 sites to be operating on the first day of the applicable required O_3 monitoring season in effect on January 1, 2017 as listed in Table D-3 of Appendix D of this part.

(10) A plan for making Photochemical Assessment Monitoring Stations (PAMS) measurements, if applicable, in accordance with the requirements of Appendix D paragraph 5(a) of this part shall be submitted to the EPA Regional Administrator no later than July 1, 2018. The plan shall provide for the required PAMS measurements to begin by June 1, 2019.

(11) An Enhanced Monitoring Plan for O_3, if applicable, in accordance with the requirements of Appendix D paragraph 5(h) of this part shall be submitted to the EPA Regional Administrator no later than October 1, 2019 or two years following the effective date of a designation to a classification of Moderate or above O_3 nonattainment, whichever is later.

(12) A detailed description of the PAMS network being operated in accordance with the requirements of Appendix D to this part shall be submitted as part of the annual monitoring network plan for review by the EPA Administrator. The PAMS Network Description described in section 5 of Appendix D may be used to meet this requirement.

(b) The annual monitoring network plan must contain the following information for each existing and proposed site:

(1) The AQS site identification number.

(2) The location, including street address and geographical coordinates.

(3) The sampling and analysis method(s) for each measured parameter.

(4) The operating schedules for each monitor.

(5) Any proposals to remove or move a monitoring station within a period of 18 months following plan submittal.

(6) The monitoring objective and spatial scale of representativeness for each monitor as defined in Appendix D to this part.

(7) The identification of any sites that are suitable and sites that are not suitable for comparison against the annual $PM_{2.5}$ NAAQS as described in §58.30.

(8) The MSA, CBSA, CSA or other area represented by the monitor.

(9) The designation of any Pb monitors as either source-oriented or non-source-oriented according to Appendix D to 40 CFR part 58.

(10) Any source-oriented monitors for which a waiver has been requested or granted by the EPA Regional Administrator as allowed for under paragraph 4.5(a)(ii) of Appendix D to 40 CFR part 58.

(11) Any source-oriented or non-source-oriented site for which a waiver has been requested or granted by the EPA Regional Administrator for the use of Pb-PM_{10} monitoring in lieu of Pb-TSP monitoring as allowed for under paragraph 2.10 of Appendix C to 40 CFR part 58.

(12) The identification of required NO_2 monitors as near-road, area-wide, or vulnerable and susceptible population monitors in accordance with Appendix D, section 4.3 of this part.

(13) The identification of any $PM_{2.5}$ FEMs and/or ARMs used in the monitoring agency's network where the data are not of sufficient quality such that data are not to be compared to the NAAQS. For required SLAMS where the agency identifies that the $PM_{2.5}$ Class III FEM or ARM does not produce data of sufficient quality for comparison to the NAAQS, the monitoring agency must ensure that an operating FRM or filter-based FEM meeting the sample frequency requirements described in §58.12 or other Class III $PM_{2.5}$ FEM or ARM with data of sufficient quality is operating and reporting data to meet the network design criteria described in Appendix D to this part.

(c) The annual monitoring network plan must document how state and local agencies provide for the review of changes to a $PM_{2.5}$ monitoring network that impact the location of a violating $PM_{2.5}$ monitor. The affected state or local agency must document the process for obtaining public comment and include any comments received through the public notification process within their submitted plan.

(d) The state, or where applicable local, agency shall perform and submit to the EPA Regional Administrator an assessment of the air quality surveillance system every 5 years to determine, at a minimum, if the network meets the monitoring objectives defined in Appendix D to this part, whether new sites are needed, whether existing sites are no longer needed and can be terminated, and whether new technologies are appropriate for incorporation into the ambient air monitoring network. The network assessment must consider the ability of existing and proposed sites to support air quality characterization for areas with relatively high populations of susceptible individuals (e.g., children with asthma), and, for any sites that are being proposed for discontinuance, the effect on data users other than the agency itself, such as nearby states and tribes or health effects studies. The state, or

where applicable local, agency must submit a copy of this 5-year assessment, along with a revised annual network plan, to the Regional Administrator. The assessments are due every five years beginning July 1, 2010.

(e) All proposed additions and discontinuations of SLAMS monitors in annual monitoring network plans and periodic network assessments are subject to approval according to §58.14.

[71 FR 61298, Oct. 17, 2006, as amended at 72 FR 32210, June 12, 2007; 73 FR 67059, Nov. 12, 2008; 73 FR 77517, Dec. 19, 2008; 75 FR 6534, Feb. 9, 2010; 75 FR 35601, June 22, 2010; 75 FR 81137, Dec. 27, 2010; 76 FR 54341, Aug. 31, 2011; 78 FR 16188, Mar. 14, 2013; 78 FR 3282, Jan. 15, 2013; 80 FR 65466, Oct. 26, 2015; 81 FR 17279, Mar. 28, 2016]

Appendix D: Monitoring Network Requirements

Ozone Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.1 Ozone (O_3) Design Criteria. (a) State, and where appropriate, local agencies must operate O_3 sites for various locations depending upon area size (in terms of population and geographic characteristics) and typical peak concentrations (expressed in percentages below or near the O_3 NAAQS). Specific SLAMS O_3 site minimum requirements are included in Table D-2 of this appendix. The NCore sites are expected to complement the O_3 data collection that takes place at single-pollutant SLAMS sites, and both types of sites can be used to meet the network minimum requirements. The total number of O_3 sites needed to support the basic monitoring objectives of public data reporting, air quality mapping, compliance, and understanding O_3-related atmospheric processes will include more sites than these minimum numbers required in Table D-2 of this appendix. The EPA Regional Administrator and the responsible State or local air monitoring agency must work together to design and/or maintain the most appropriate O_3 network to service the variety of data needs in an area.

TABLE D–2 OF APPENDIX D TO PART 58 SLAMS MINIMUM O_3 MONITORING REQUIREMENTS

MSA population[1, 2]	**Most recent 3-year design value concentrations ≥85% of any O_3 NAAQS[3]**	**Most recent 3-year design value concentrations <85% of any O_3 NAAQS[3,4]**
>10 million	4	2
4–10 million	3	1
350,000–<4 million	2	1
50,000–<350,000 [5]	1	0

1. Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

2. Population based on latest available census figures.

3. The ozone (O_3) National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

4. These minimum monitoring requirements apply in the absence of a design value.

5. Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

(b) Within an O_3 network, at least one O_3 site for each MSA, or CSA if multiple MSAs are involved, must be designed to record the maximum concentration for that particular metropolitan area. More than one maximum concentration site may be necessary in some areas. Table D-2 of this appendix does not account for the full breadth of additional factors that would be considered in designing a complete O_3 monitoring program for an area. Some of these additional factors include geographic size, population density, complexity of terrain and meteorology, adjacent O_3 monitoring programs, air pollution transport from neighboring areas, and measured air quality in comparison to all forms of the O_3 NAAQS (i.e., 8-hour and 1-hour forms). Networks must be designed to account for all of these area characteristics. Network designs must be re-examined in periodic network assessments. Deviations from the above O_3 requirements are allowed if approved by the EPA Regional Administrator.

CO Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.2.1 General Requirements. (a) Except as provided in subsection (b), one CO monitor is required to operate collocated with one required near-road NO_2 monitor, as required in Section 4.3.2 of this part, in CBSAs having a population of 1,000,000 or more persons. If a CBSA has more than one required near-road NO_2 monitor, only one CO monitor is required to be collocated with a near-road NO_2 monitor within that CBSA.

(b) If a state provides quantitative evidence demonstrating that peak ambient CO concentrations would occur in a near-road location which meets microscale siting criteria in Appendix E of this part but is not a near-road NO_2 monitoring site, then the EPA Regional Administrator may approve a request by a state to use such an alternate near-road location for a CO monitor in place of collocating a monitor at near-road NO_2 monitoring site.

NO_2 Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.3.2 Requirement for Near-road NO_2 Monitors

(a) Within the NO_2 network, there must be one microscale near-road NO_2 monitoring station in each CBSA with a population of 1,000,000 or more persons to monitor a location of expected maximum hourly concentrations sited near a major road with high annual average daily traffic (AADT) counts as specified in paragraph 4.3.2(a)(1) of this appendix. An additional near-road NO2 monitoring station is required for any CBSA with a population of 2,500,000 persons or more, or in any CBSA with a population of 1,000,000 or more persons that has one or more roadway segments with 250,000 or greater AADT counts to monitor a second location of expected maximum hourly concentrations. CBSA populations shall be based on the latest available census figures.

(1) The near-road NO_2 monitoring sites shall be selected by ranking all road segments within a CBSA by AADT and then identifying a location or locations adjacent to those highest ranked road segments, considering fleet mix, roadway design, congestion patterns, terrain, and meteorology, where maximum hourly NO_2 concentrations are expected to occur and siting criteria can be met in accordance with appendix E of this part. Where a state or local air monitoring agency identifies multiple acceptable candidate sites where maximum hourly NO_2 concentrations are expected to occur, the monitoring agency shall consider the potential for population exposure in the criteria utilized to select the final site location. Where one CBSA is required to have two near-road NO_2 monitoring stations, the sites shall be differentiated from each other by one or more of the following factors: fleet mix; congestion patterns; terrain; geographic area within the CBSA; or different route, interstate, or freeway designation.

(b) Measurements at required near-road NO_2 monitor sites utilizing chemiluminescence FRMs must include at a minimum: NO, NO_2, and NO_X.

SO_2 Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.4 Sulfur Dioxide (SO_2) Design Criteria.

4.4.1 General Requirements. (a) State and, where appropriate, local agencies must operate a minimum number of required SO2 monitoring sites as described below.

4.4.2 Requirement for Monitoring by the Population Weighted Emissions Index. (a) The population weighted emissions index (PWEI) shall be calculated by States for each core based statistical area (CBSA) they contain or share with another State or States for use in the implementation of or adjustment to the SO2 monitoring network. The PWEI shall be calculated by multiplying the population of each CBSA, using the most current census data or estimates, and the total amount of SO2 in tons per year emitted within the CBSA area, using an aggregate of the most recent county level emissions data available in the National Emissions Inventory for each county in each CBSA. The resulting product shall be divided by one million, providing a PWEI value, the units of which are million persons-tons per year. For any CBSA with a calculated PWEI value equal to or greater than 1,000,000, a minimum of three SO2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 100,000, but less than 1,000,000, a minimum of two SO2 monitors are required within that CBSA. For any CBSA with a calculated PWEI value equal to or greater than 5,000, but less than 100,000, a minimum of one SO2 monitor is required within that CBSA.

(1) The SO2 monitoring site(s) required as a result of the calculated PWEI in each CBSA shall satisfy minimum monitoring requirements if the monitor is sited within the boundaries of the parent CBSA and is one of the following site types (as defined in section 1.1.1 of this appendix): population exposure, highest concentration, source impacts, general background, or regional transport. SO2 monitors at NCore stations may satisfy minimum monitoring requirements if that monitor is located within a CBSA with minimally required monitors under this part. Any monitor that is sited outside of a CBSA with minimum monitoring requirements to assess the highest concentration resulting from the impact of significant sources or source categories existing within that CBSA shall be allowed to count towards minimum monitoring requirements for that CBSA.

Table 7: TDEC DAPC Interpretation of the PWEI SO_2 Monitoring Requirements

CBSA AREA NAME	POP ESTIMATE 2017	2011 NEI SO_2 Tons	2011 NEI Data (03/23/2016)							2014 V2 NEI Data (4/12/18)			
			PWEI 2010	PWEI 2011	PWEI 2012	PWEI 2013	PWEI 2014	PWEI 2015	SO_2 Monitors Required	2014 SO_2 NEI Tons*	PWEI 2016	PWEI 2017	SO_2 Monitors Required
Chattanooga, TN-Ga	556,548	953	503	508	512	516	219	525	-	260	2,187	144	-
Clarksville, TN-KY	285,042	431	112	114	119	118	120	122	-	567	196	162	-
Cleveland, TN	122,317	5	1	1	1	1	1	1	-	151	21	18	-
Jackson, TN	129,235	154	20	20	20	20	20	20	-	190	27	25	-
Johnson City, TN	202,053	4	1	1	1	1	1	1	-	100	25	20	-
Kingsport-Bristol-Bristol, TN-VA	306,659	39,082	12,098	12,080	12,071	12,051	12,040	11,972	1	22,164	6,808	6,797	1
Knoxville, TN	877,104	28,722	24,057	24,207	24,351	24,470	24,632	14,947	1	4,726	4,297	4,145	-
Memphis, TN-MS-AR	1,348,260	15,025	19,905	20,025	20,144	20,159	20,182	20,176	1	14,245	19,643	19,207	1
Morristown, TN	118,081	21	2	2	2	2	2	3	-	41	8	5	-
Nashville-Davidson-Murfreesboro-Franklin, TN	1,903,045	24,560	41,038	41,710	42,419	43,191	44,028	45,812	1	20,981	3,982	39,927	1

*NEI data not including mobile sources of SO2

4.4.3 *Regional Administrator Required Monitoring.* (a) The Regional Administrator may require additional SO_2 monitoring stations above the minimum number of monitors required in 4.4.2 of this part, where the minimum monitoring requirements are not sufficient to meet monitoring objectives. The Regional Administrator may require, at his/her discretion, additional monitors in situations where an area has the potential to have concentrations that may violate or contribute to the violation of the NAAQS, in areas impacted by sources which are not conducive to modeling, or in locations with susceptible and vulnerable populations, which are not monitored under the minimum monitoring provisions described above. The Regional Administrator and the responsible State or local air monitoring agency shall work together to design and/or maintain the most appropriate SO_2 network to provide sufficient data to meet monitoring objectives.

4.4.5 *NCore Monitoring.* (a) SO_2 measurements are included within the NCore multipollutant site requirements as described in paragraph (3)(b) of this appendix. NCore-based SO_2 measurements are primarily used to characterize SO_2 trends and assist in understanding SO_2 transport across representative areas in urban or rural locations and are also used for comparison with the SO_2 NAAQS. SO_2 monitors at NCore sites that exist in CBSAs with minimum monitoring requirements per section 4.4.2 above shall be allowed to count towards those minimum monitoring requirements.

Lead Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.5 *Lead (Pb) Design Criteria.* (a) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near Pb sources which are expected to or have been shown to contribute to a maximum Pb concentration in ambient air in excess of the NAAQS, taking into account the logistics and potential for population exposure. At a minimum, there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each non-airport Pb source which emits 0.50 or more tons per year and from each airport which emits 1.0 or more tons per year based on either the most recent National Emission Inventory (*http://www.epa.gov/ttn/chief/eiinformation.html*) or other scientifically justifiable methods and data (such as improved emissions factors or site-specific data) taking into account logistics and the potential for population exposure.

(i) One monitor may be used to meet the requirement in paragraph 4.5(a) for all sources involved when the location of the maximum Pb concentration due to one Pb source is expected to also be impacted by Pb emissions from a nearby source (or multiple sources). This monitor must be sited, taking into account logistics and the potential for population exposure, where the Pb concentration from all sources combined is expected to be at its maximum.

(ii) The Regional Administrator may waive the requirement in paragraph 4.5(a) for monitoring near Pb sources if the State or, where appropriate, local agency can demonstrate the Pb source will not contribute to a maximum Pb concentration in ambient air in excess of 50 percent of the NAAQS (based on historical monitoring data, modeling, or other means). The waiver must be renewed once every 5 years as part of the network assessment required under §58.10(d).

(iii) State and, where appropriate, local agencies are required to conduct ambient air Pb monitoring near each of the airports listed in Table D-3A for a period of 12 consecutive months commencing no later than December 27, 2011. Monitors shall be sited to measure the maximum Pb concentration in ambient air, taking into account logistics and the potential for population exposure, and shall use an approved Pb-TSP Federal Reference Method or Federal Equivalent Method. Any monitor that exceeds 50 percent of the Pb NAAQS on a rolling 3-month average (as determined according to 40 CFR part 50, Appendix R) shall become a required monitor under paragraph 4.5(c) of this Appendix, and shall continue to monitor for Pb unless a waiver is granted allowing it to stop operating as allowed by the provisions in paragraph 4.5(a)(ii) of this appendix. Data collected shall be submitted to the Air Quality System database according to the requirements of 40 CFR part 58.16.

$PM_{2.5}$ Monitoring Network Requirements

40 CFR 58 Subpart G, Appendix D to Part 58 revised on December 30, 2016

4.7.1 General Requirements. (a) State, and where applicable local, agencies must operate the minimum number of required $PM_{2.5}$ SLAMS sites listed in Table D-5 of this appendix. The NCore sites are expected to complement the $PM_{2.5}$ data collection that takes place at non-NCore SLAMS sites, and both types of sites can be used to meet the minimum $PM_{2.5}$ network requirements. Deviations from these $PM_{2.5}$ monitoring requirements must be approved by the EPA Regional Administrator.

Table D-5 of Appendix D to Part 58—$PM_{2.5}$ Minimum Monitoring Requirements

MSA population[1] [2]	Most recent 3-year design value ≥85% of any $PM_{2.5}$ NAAQS[3]	Most recent 3-year design value <85% of any $PM_{2.5}$ NAAQS[3] [4]
>1,000,000	3	2
500,000-1,000,000	2	1
50,000-<500,000[5]	1	0

[1]Minimum monitoring requirements apply to the Metropolitan statistical area (MSA).

[2]Population based on latest available census figures.

[3]The $PM_{2.5}$ National Ambient Air Quality Standards (NAAQS) levels and forms are defined in 40 CFR part 50.

[4]These minimum monitoring requirements apply in the absence of a design value.

[5]Metropolitan statistical areas (MSA) must contain an urbanized area of 50,000 or more population.

(b) Specific Design Criteria for $PM_{2.5}$. The required monitoring stations or sites must be sited to represent area-wide air quality. These sites can include sites collocated at PAMS. These monitoring stations will typically be at neighborhood or urban-scale; however, micro-or middle-scale $PM_{2.5}$ monitoring sites that represent many such locations throughout a metropolitan area are considered to represent area-wide air quality.

(1) At least one monitoring station is to be sited at neighborhood or larger scale in an area of expected maximum concentration.

(2) For CBSAs with a population of 1,000,000 or more persons, at least one $PM_{2.5}$ monitor is to be collocated at a near-road NO_2 station required in section 4.3.2(a) of this appendix.

(3) For areas with additional required SLAMS, a monitoring station is to be sited in an area of poor air quality.

(4) Additional technical guidance for siting $PM_{2.5}$ monitors is provided in references 6 and 7 of this appendix.

(c) The most important spatial scale to effectively characterize the emissions of particulate matter from both mobile and stationary sources is the neighborhood scale for $PM_{2.5}$. For purposes of establishing monitoring sites to represent large homogenous areas other than the above scales of representativeness and to characterize regional transport, urban or regional scale sites would also be needed. Most $PM_{2.5}$ monitoring in urban areas should be representative of a neighborhood scale.

(1) *Micro-scale.* This scale would typify areas such as downtown street canyons and traffic corridors where the general public would be exposed to maximum concentrations from mobile sources. In some circumstances, the micro-scale is appropriate for particulate sites. SLAMS sites measured at the micro-scale level should, however, be limited to urban sites that are representative of long-term human exposure and of many such microenvironments in the area. In general, micro-scale particulate matter sites should be located near inhabited buildings or locations where the general public can be expected to be exposed to the concentration measured. Emissions from stationary sources such as primary and secondary smelters, power plants, and other large industrial processes may, under certain plume conditions, likewise result in high ground level concentrations at the micro-scale. In the latter case, the micro-scale would represent an area impacted by the plume with dimensions extending up to approximately 100 meters. Data collected at micro-scale sites provide information for evaluating and developing hot spot control measures.

(2) *Middle scale*—People moving through downtown areas, or living near major roadways, encounter particle concentrations that would be adequately characterized by this spatial scale. Thus, measurements of this type would be appropriate for the evaluation of possible short-term exposure public health effects of particulate matter pollution. In many situations, monitoring sites that are representative of microscale or middle-scale

impacts are not unique and are representative of many similar situations. This can occur along traffic corridors or other locations in a residential district. In this case, one location is representative of a number of small scale sites and is appropriate for evaluation of long-term or chronic effects. This scale also includes the characteristic concentrations for other areas with dimensions of a few hundred meters such as the parking lot and feeder streets associated with shopping centers, stadia, and office buildings.

(3) *Neighborhood scale*—Measurements in this category would represent conditions throughout some reasonably homogeneous urban sub-region with dimensions of a few kilometers and of generally more regular shape than the middle scale. Homogeneity refers to the particulate matter concentrations, as well as the land use and land surface characteristics. Much of the $PM_{2.5}$ exposures are expected to be associated with this scale of measurement. In some cases, a location carefully chosen to provide neighborhood scale data would represent the immediate neighborhood as well as neighborhoods of the same type in other parts of the city. $PM_{2.5}$ sites of this kind provide good information about trends and compliance with standards because they often represent conditions in areas where people commonly live and work for periods comparable to those specified in the NAAQS. In general, most $PM_{2.5}$ monitoring in urban areas should have this scale.

(4) *Urban scale*—This class of measurement would be used to characterize the particulate matter concentration over an entire metropolitan or rural area ranging in size from 4 to 50 kilometers. Such measurements would be useful for assessing trends in area-wide air quality, and hence, the effectiveness of large scale air pollution control strategies. Community-oriented $PM_{2.5}$ sites may have this scale.

(5) *Regional scale*—These measurements would characterize conditions over areas with dimensions of as much as hundreds of kilometers. As noted earlier, using representative conditions for an area implies some degree of homogeneity in that area. For this reason, regional scale measurements would be most applicable to sparsely populated areas. Data characteristics of this scale would provide information about larger scale processes of particulate matter emissions, losses and transport. $PM_{2.5}$ transport contributes to elevated particulate concentrations and may affect multiple urban and State entities with large populations such as in the eastern United States. Development of effective pollution control strategies requires an understanding at regional geographical scales of the emission sources and atmospheric processes that are responsible for elevated $PM_{2.5}$ levels and may also be associated with elevated O_3 and regional haze.

4.7.2 Requirement for Continuous $PM_{2.5}$ Monitoring. The State, or where appropriate, local agencies must operate continuous $PM_{2.5}$ analyzers equal to at least one-half (round up) the minimum required sites listed in Table D-5 of this appendix. At least one required continuous analyzer in each MSA must be collocated with one of the required FRM/FEM/ARM monitors, unless at least one of the required FRM/FEM/ARM monitors is itself a continuous FEM or ARM monitor in which case no collocation requirement applies. State and local air monitoring agencies must use methodologies and quality assurance/quality control (QA/QC) procedures approved by the EPA Regional Administrator for these required continuous analyzers.

4.7.3 Requirement for $PM_{2.5}$ Background and Transport Sites. Each State shall install and operate at least one $PM_{2.5}$ site to monitor for regional background and at least one $PM_{2.5}$ site to monitor regional transport. These monitoring sites may be at community-oriented sites and this requirement may be satisfied by a corresponding monitor in an area having similar air quality in another State. State and local air monitoring agencies must use methodologies and QA/QC procedures approved by the EPA Regional Administrator for these sites. Methods used at these sites may include non-federal reference method samplers such as IMPROVE or continuous $PM_{2.5}$ monitors.

4.7.4 $PM_{2.5}$ Chemical Speciation Site Requirements. Each State shall continue to conduct chemical speciation monitoring and analyses at sites designated to be part of the $PM_{2.5}$ Speciation Trends Network (STN). The selection and modification of these STN sites must be approved by the Administrator. The $PM_{2.5}$ chemical speciation urban trends sites shall include analysis for elements, selected anions and cations, and carbon. Samples must be collected using the monitoring methods and the sampling schedules approved by the

Administrator. Chemical speciation is encouraged at additional sites where the chemically resolved data would be useful in developing State implementation plans and supporting atmospheric or health effects related studies.

Index reporting requirements

40 CFR 58 Subpart G, 58.50 Revised as of October 26, 2015.

58.50 Index reporting.

(a) The state or where applicable, local agency shall report to the general public on a daily basis through prominent notice an air quality index that complies with the requirements of Appendix G: Annual Site Evaluations to this part.

(b) Reporting is required for all individual MSA with a population exceeding 350,000.

(c) The population of a MSA for purposes of index reporting is the most recent decennial U.S. census population.

Geographic area	**2010 Census**	**2017 Census Est.**	**Required to Have AQI Reporting**	**Daily AQI/Air Quality Forecasts Provided**
Chattanooga, TN-GA	528143	**556548**	**Yes**	**Yes**
Clarksville, TN-KY	260625	285042	No	Yes
Cleveland, TN	115788	122317	No	No
Jackson, TN	130011	129235	No	No
Johnson City, TN	198716	202053	No	Yes Based on the combined population of both areas.
Kingsport-Bristol-Bristol, TN-VA	309544	306659	No	
Knoxville, TN	837571	877104	**Yes**	Yes In addition, the GSMNP has a separate AQI/Forecast provided.
Memphis, TN-MS-AR	1324829	**1348260**	**Yes**	Yes
Morristown, TN	113951	118081	No	No
Nashville-Davidson--Murfreesboro, TN	1670890	**1903045**	**Yes**	**Yes**

NCore Monitoring Network Requirements and PM $_{10-2.5}$

40 CFR 58 Subpart G, Appendix D to Part 58 Revised as of December 30, 2016

(a) Each State (i.e. the fifty States, District of Columbia, Puerto Rico, and the Virgin Islands) is required to operate at least one NCore site. States may delegate this requirement to a local agency. States with many MSAs often also have multiple air sheds with unique characteristics and, often, elevated air pollution. These States include, at a minimum, California, Florida, Illinois, Michigan, New York, North Carolina, Ohio, Pennsylvania, and Texas. These States are required to identify one to two additional NCore sites in order to account for their unique situations. These additional sites shall be located to avoid proximity to large emission sources. Any State or local agency can propose additional candidate NCore sites or modifications to these requirements for approval by the Administrator. The NCore locations should be leveraged with other multipollutant air monitoring sites including PAMS sites, National Air Toxics Trends Stations (NATTS) sites, CASTNET sites, and STN sites. Site leveraging includes using the same monitoring platform and equipment to meet the objectives of the variety of programs where possible and advantageous.

(b) The NCore sites must measure, at a minimum, PM2.5 particle mass using continuous and integrated/filter-based samplers, speciated PM2.5, PM10-2.5 particle mass, O3, SO2, CO, NO/NOY, wind speed, wind direction, relative humidity, and ambient temperature.

(1) Although the measurement of reactive nitrogen compounds (NOy) is required in support of a number of monitoring objectives, available commercial instruments may indicate little difference in their measurement of NOy compared to the conventional measurement of nitrogen oxides (NOx), particularly in areas with relatively fresh sources of nitrogen emissions. Therefore, in areas with negligible expected difference between NOy and NOx measured concentrations, the Administrator may allow for waivers that permit NOX monitoring to be substituted for the required NOy monitoring at applicable NCore sites.

(2) The EPA recognizes that, in some cases, the physical location of the NCore site may not be suitable for representative meteorological measurements due to the site's physical surroundings. It is also possible that nearby meteorological measurements may be able to fulfill this data need. In these cases, the requirement for meteorological monitoring can be waived by the Administrator.

40 CFR 58 Subpart G, Appendix D to Part 58 revised as of December 30, 2016

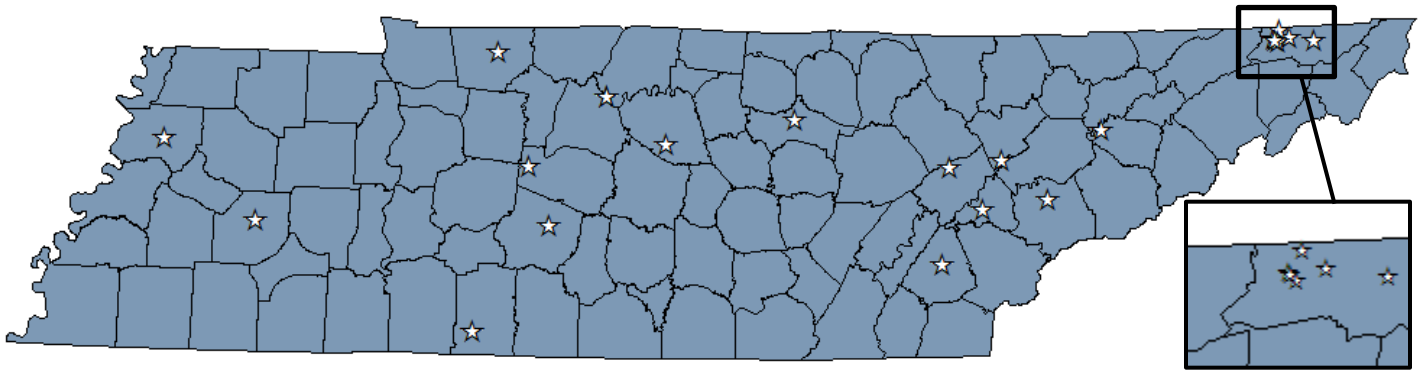
Coarse Particulate Matter (PM10-2.5) Design Criteria.

4.8.1 General Monitoring Requirements. (a) The only required monitors for $PM_{10-2.5}$ are those required at NCore Stations.

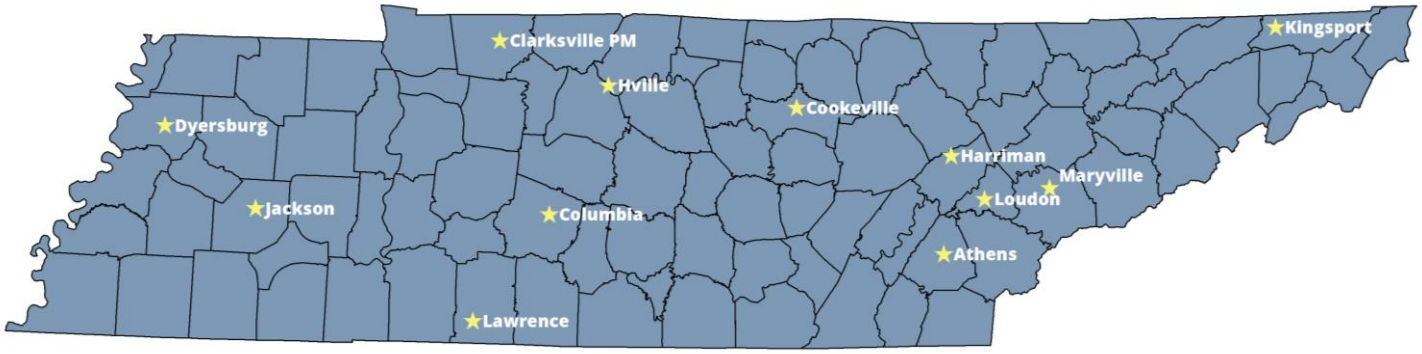
(b) Although microscale monitoring may be appropriate in some circumstances, middle and neighborhood scale measurements are the most important station classifications for $PM_{10-2.5}$ to assess the variation in coarse particle concentrations that would be expected across populated areas that are in proximity to large emissions sources.

Appendix E: TDEC DAPC Monitor Maps

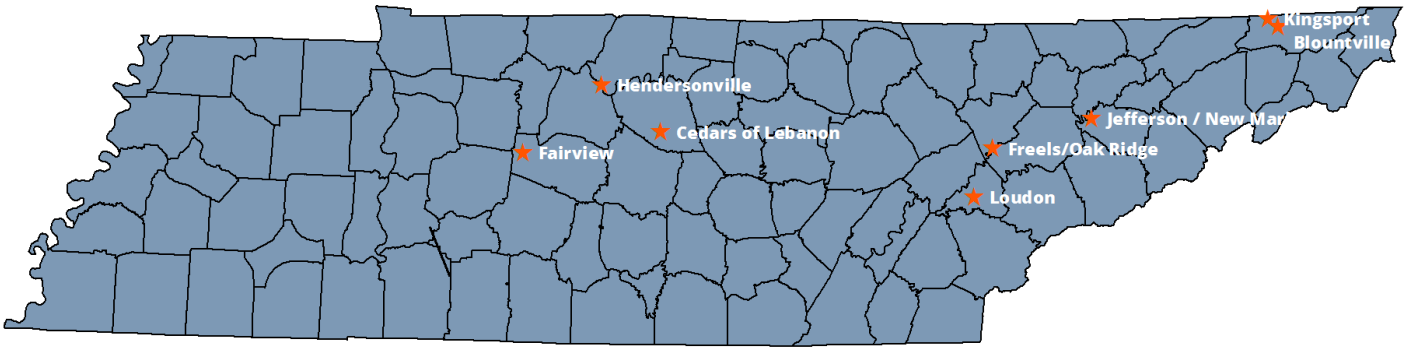
All Monitoring Sites Operated by TDEC DAPC



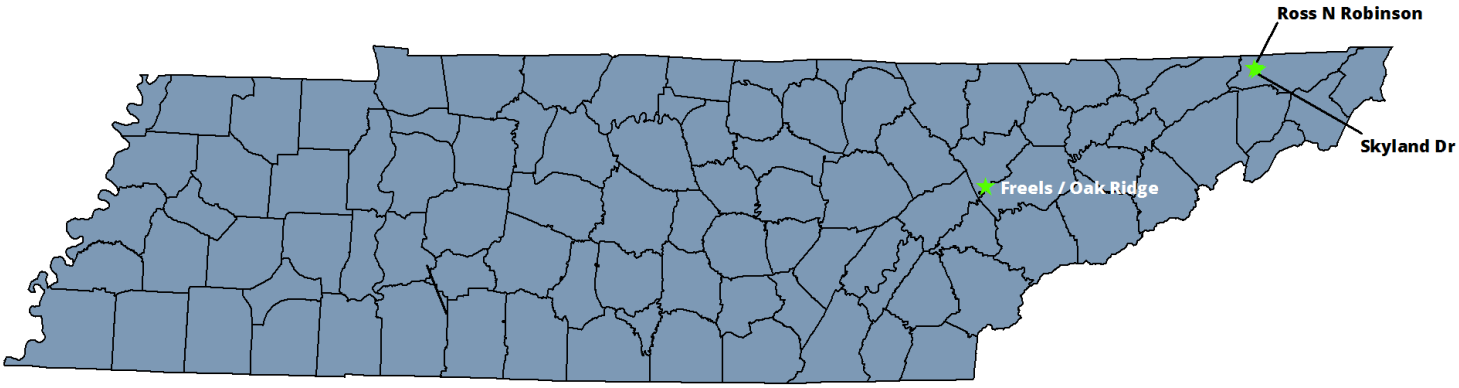
$PM_{2.5}$ Monitor Locations



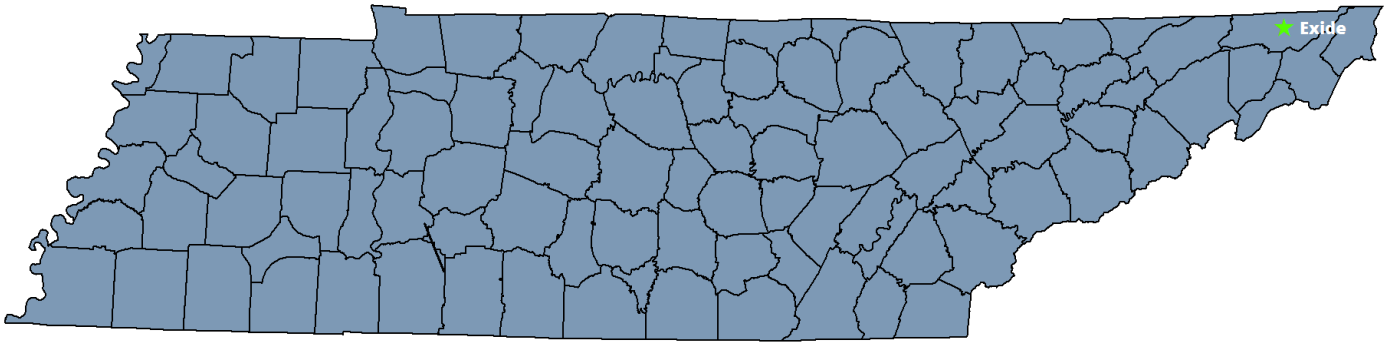
Ozone Monitor Locations



SO_2 Monitor Locations



Lead Monitor Locations



Appendix F: EPA Request and Approval Letters

Jackson and Lawrence Site Waiver

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

MAR 14 2017

Ms. Michelle Walker Owenby
Director
Division of Air Pollution Control
Tennessee Department of Environment and Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243

Dear Ms. Owenby:

Thank you for your March 6, 2017, letter requesting waivers to the 40 CFR Part 58, Appendix E siting requirements for the Jackson monitoring site (Air Quality System (AQS) # 47-113-0006) Jackson, TN and the Lawrence monitoring site (AQS # 47-099-0002) located in Loretto, TN. Based on the information provided in your request, the U.S. Environmental Protection Agency Region 4 has determined that the Tennessee Department of Environment and Conservation (TDEC) has met the requirements for waiving the monitor siting requirements for both sites and is approving the waiver requests through December 31, 2017. Below is a more detailed explanation for our approval.

The basis for your request references 40 CFR Part 58, Appendix E, Section 10, which states a waiver can be granted if "the monitor or probe cannot reasonably be located so as to meet the siting criteria because of physical constraints (e.g., inability to locate the required type of site the necessary distance from roadways or obstructions)." The TDEC noted existing trees are encroaching on the monitoring sites and the property owners will not allow the trees to be trimmed or removed. The TDEC is in the process of investigating new sites to relocate both the Jackson and Lawrence $PM_{2.5}$ monitoring sites. The new sites will be proposed in the TDEC's 2017 Annual Network Plan, and the sites will begin collecting data by January 1, 2018.

The EPA reviewed the information submitted by the TDEC and determined both sites meet the waiver requirement in 40 CFR Part 58, Appendix E, Section 10.2. The EPA also reviewed the 2015 design values (DV) and the preliminary 2016 DVs for the two sites. The Jackson site recorded a 2015 DV of 8.3 ug/m^3 and a preliminary 2016 DV of 7.7 ug/m^3. The Lawrence site recorded a 2015 DV of 7.7 ug/m^3 and a preliminary 2016 DV of 7.4 ug/m^3. These DVs are below the national ambient air quality standard (NAAQS) of 12 ug/m^3.

The EPA has determined that the TDEC's request for a waiver of the siting requirements is justified because: 1) the Jackson and Lawrence sites meet the waiver request requirement, 2) the DVs are below the NAAQS, and 3) the TDEC will propose new locations that meet siting requirements in the 2017 Annual Network Plan (with relocation to occur by December 31, 2017). The EPA approves the waiver requests through December 31, 2017. If the sites are not relocated and operating by January 1, 2018, the TDEC will be required to submit a new waiver request.

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The EPA agrees with the TDEC that the $PM_{2.5}$ data collected at the existing sites must be flagged with an "SX" qualifier in AQS during the time the siting issues remain. If you have any questions or concerns about this matter, please contact me or have your staff contact Ms. Sara Waterson at (404) 562-9061 or waterson.sara@epa.gov.

Sincerely,

Beverly H. Banister
Director
Air, Pesticides and Toxics Management Division

cc: Dr. Jason Stephens, Environmental Manager 3
Division of Air Pollution Control

Blountville Monitoring Site

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

FEB 23 2017

Ms. Michelle Walker Owenby
Director
Division of Air Pollution Control
Tennessee Department of Environment and Conservation
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue, 15th Floor
Nashville, Tennessee 37243

Dear Ms. Owenby:

Thank you for submitting a request to relocate the Blountville monitoring site (AQS # 47-163-2002), dated February 10, 2017. In order to meet 40 CFR Part 58 Appendix E siting requirements, the Tennessee Department of Environment and Conservation stated the site would be moved approximately 25 meters southwest of the current site to address drip line obstructions. Due to the proximity to the current site, the U.S. Environmental Protection Agency Region 4 considers this a reconfiguration of the site rather than a relocation; therefore, public inspection and comment are not required. The EPA approves the reconfiguration of the ozone monitor at the Blountville monitoring site. The new location will continue to report data to AQS # 47-163-2002.

Thank you for working with us to monitor air pollution and promote healthy air quality in Tennessee and the nation. If you have any questions or concerns, please contact Gregg Worley at (404) 562-9141 or Sara Waterson at (404) 562-9061.

Sincerely,

Beverly H. Banister
Director
Air, Pesticides and Toxics Management Division

cc: Mr. Jason Stephens
Manager 3, Tennessee Department
of Environment and Conservation

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Fairview Relocation Request

TN Environment & Conservation

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT & CONSERVATION
DIVISION OF AIR POLLUTION CONTROL
WILLIAM R. SNODGRASS TENNESSEE TOWER
312 ROSA L. PARKS AVENUE, 15TH FLOOR
NASHVILLE, TENNESSEE 37243

February 1, 2017

Beverly H. Banister, Director
Air, Pesticides, & Toxics Management Division
US EPA Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth St, SW
Atlanta, GA 30303-8960

Dear Ms. Banister:

The State of Tennessee (TDEC DAPC) would like to request that the EPA approve the relocation of the Fairview ozone monitoring site located in Williamson County, Tennessee. This proposal is described in more detail in the enclosed document. The Fairview site contains one ozone monitor (AQS # 47- 187- 0106). Under the proposal, the site would be moved approximately 221.8 meters southwest of the current site to address drip line obscuration issues and render the site compliant with 40 CFR part 58 Appendix E. This monitor would cease operation and reporting data to the AQS database after the new site has begun to collect data. If approved, the State of Tennessee will start reporting data to the AQS database once the new site is fully functional. The estimated shutdown/startup would take place on or before June 2016.

The current site no longer meets EPA siting criteria. The Williamson Board of Education has agreed to allow TDEC DAPC to relocate the site. The proposed location will comply with EPA 40 CFR part 58 Appendix E requirements.

This proposal is in response to the technical systems audit (TSA) conducted on June 13-17, 2016 for the operational period from January 2013 through December 2015. The audit was conducted by EPA Region 4's Science and Ecosystem Support Division (SESD). The TSA team included Douglas Jager and Richard Guillot.

As a result of the TSA, SESD recommended that TDEC DAPC prioritize our corrective actions according to the findings detailed in Sections 4.1.1 of the TSA report:

Division of Air Pollution Control
William R. Snodgrass Tennessee Tower •15th Floor
312 Rosa L. Parks Avenue • Nashville, TN 37243
Tel: 615-532-0554 • Fax: 615-532-0614
Air.Pollution.Control@tn.gov

TN Environment & Conservation

Nine out of eleven air monitoring stations did not meet established regulatory requirements for distance and spacing (40 CFR part 58 Appendix E).

DAPC must address these siting issues as quickly as possible. Because SESD only inspected a subset of the monitoring stations in the air monitoring network, DAPC must evaluate the remaining sites to ensure compliance with EPA siting requirements. Corrective action measures for nonconforming sites must be completed prior to the start of the 2017 ozone season. The trees may be removed or trimmed, the probe line location(s) may be adjusted, or the sites may be relocated away from these obstacles. For some locations, however, DAPC may need to submit to EPA Region 4 APTMD a request for a waiver, in accordance with the provisions stated in 40 CFR Part 58 Appendix E §10.

With regards to the data collected in the DAPC network, SESD recommends data associated with the violating sites (samplers/analyzers) be flagged in the AQS database. Because the length of time the sites have been out of compliance with the regulations cannot be precisely defined, data must be flagged from January 1, 2016, and continue to be flagged until evidence is provided to EPA demonstrating these siting issues have been corrected. Measurement results impacted by these siting issues must be flagged with the AQS "SX" quality assurance qualifier code (i.e., Does Not Meet Siting Criteria).

TDEC is committed to acting upon the EPA SESD recommendations. Thank you for working with us to monitor air pollution and promote healthy air quality in Tennessee. If you have any questions or concerns, please contact Jason Stephens at (615) 532-0584.

Sincerely,

Quinas N. Stephens III

for Michelle Walker Owenby, Director
Department of Environment and Conservation
Division of Air Pollution

Copy via Email to: Todd Rinck – rinck.todd@epa.gov, Sara Waterson – waterson.sara@epa.gov
Attachment: Fairview Site Information 47- 187- 0106

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Tel: 615-532-0554 • Fax: 615-532-0614
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Appendix G: Annual Site Evaluations & Documentation

Annual site evaluation, relocation, reconfiguration, and new site documentation can be found at TDEC DAPC's Air Quality Monitoring & Forecasting website:

https://www.tn.gov/environment/program-areas/apc-air-pollution-control-home/-air-quality-forecasting.html.